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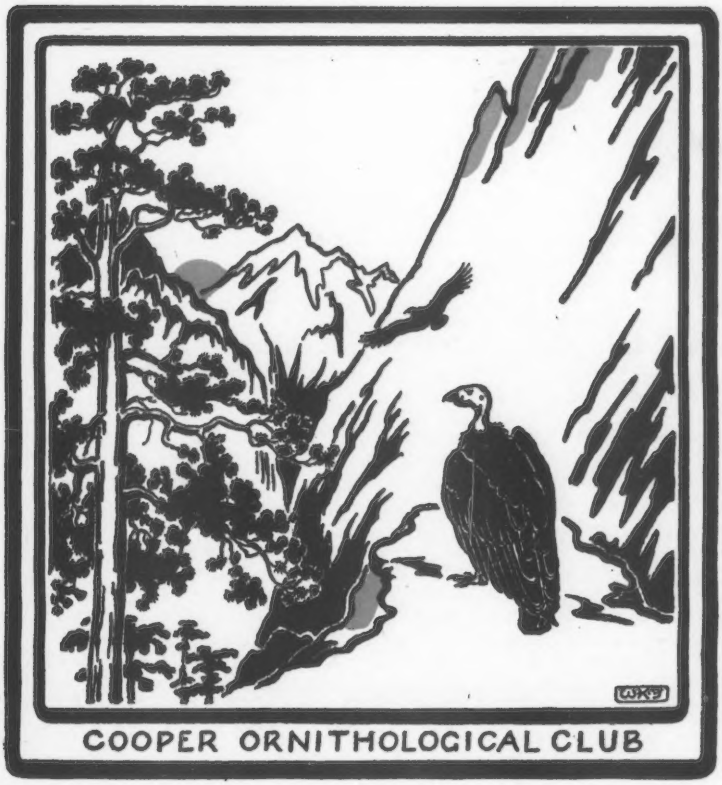
THE CONDOR

A Magazine of Western Ornithology

Volume XLI May-June, 1939 Number 3



COOPER ORNITHOLOGICAL CLUB

THE CONDOR

A Magazine of Western Ornithology

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THE CONDOR

VOLUME XLI MAY-JUNE, 1939 NUMBER 3

NOTES ON THE DISTRIBUTION OF WHISTLING SWAN AND CANADA GOOSE IN CALIFORNIA

WITH ONE ILLUSTRATION

By JAMES MOFFITT

In this fourth and in succeeding installments of distributional notes on waterfowl in California, are included besides personal observations some of those of U. S. Game Management Agent H. M. Worcester, made in Siskiyou County, from 1931 to 1933, when he was Manager of the Federal Tule Lake Wildlife Refuge. Permission to include Mr. Worcester's important observations, which so materially add to mine for the region, was kindly granted by Dr. I. N. Gabrielson, Chief, Bureau of Biological Survey, and thanks are hereby expressed for this courtesy and to Mr. Worcester for his coöperation. In the following accounts, such observations are credited to "Worcester MS." Also included, as "Murphy MS," are valuable observations of my friend Mr. R. D. Murphy in Honey Lake Valley, Lassen County, during the latter part of his twelve-year residence there. These observations were detailed in his numerous letters to me from 1931 to 1933.

Cygnus columbianus. Whistling Swan. Fall migrants first appear in northeastern California; earliest recorded at Tule Lake, 110 birds, on October 22; 200 on October 28, 1932. In 1931, first seen November 5, 2000 individuals, next November 9, after which common for a month but never more than 1500 present; last noted December 11 (freeze-up November 19). Less plentiful in November, 1932, when not over a thousand were present at period of greatest concentration; last seen December 5, 91 individuals. In 1933, seven birds, the first spring migrants, appeared at Tule Lake on February 20; next day, 57 present. These dates marked the arrival of the first spring transients, including three kinds of geese and mallard and pintail ducks. The lake was still solidly frozen over, the break-up commencing on March 1, with the temperature up to 43 degrees Fahrenheit, after rain the preceding day (Worcester MS). March 7, 1933, Dr. John C. Phillips and I saw nearly a thousand swans on Tule Lake.

In Honey Lake Valley, the earliest swans appeared on January 28, 1933. This was the first of 12 years in which some swans had not remained through the winter, an exceptionally cold one with temperatures down to 30 degrees below zero. The swans left after a blizzard on December 9, 1932. Cold weather continued until February 12, and ice did not leave the sloughs until February 23 (Murphy MS). On March 10, 1933, Dr. Phillips and I saw between 600 and 700 swans on a reservoir near the then dry Honey Lake and 25 birds elsewhere. The day before, we saw 300 swans on marshes five miles south of Alturas, Modoc County.

My earliest fall record for central California is of five swans on the Spalding Ranch, near Willows, Sacramento Valley, November 3, 1929; but the species does not reach this vicinity in numbers until late November or early December. Thus, it appears that these are probably the same birds that spend most of November in northeastern California.

About 75 swans wintered on the Pringle Pond, a mile west of Suisun, Solano County, prior to February 17, 1929. They left between that date and the 22nd. None was seen here March 2, or in extensive travels about the Colusa, Butte Creek and Willows districts of the Sacramento Valley, the next day. Presumably, all had migrated northward. Ten swans found on a lake near West Butte, Sutter County, March 23, 1931, afford a seasonally late occurrence for the region.

Swans have been found to be generally distributed over watered areas of the Sacramento and San Joaquin valleys and on the Suisun Marshes from early December to mid-February in recent years. Lesser numbers have been observed near the sea-coast. Occasionally, large concentrations of swans have been noted in the Sacramento Valley, as one of fully 2000 birds four miles north of West Butte, in December, 1928. Another concentration, seasonally late for the region and probably pre-migratory in character, of nearly a thousand swans, was noted near Willows, February 26, 1933 (fig. 28).

As with Canada Geese, swans winter in California principally on fresh water and both species are rare on salt water, where many sojourn along the Atlantic Coast. Differences in available food supply on the two coasts probably account largely for the discrepancy in habits. I have recorded (Condor, vol. 39, 1937, p. 150) presence of

Fig. 28. Part of a pre-migratory concentration of nearly a thousand Whistling Swans rising from feeding ground in rice stubble near Willows, California; February 26, 1933.

Whistling Swans on fresh water bordering the Pacific Ocean west of Ferndale, Humboldt County, where also noted February 12, 1932. At Lake Earl, Del Norte County, a freshwater lake within a mile of the ocean, two old and three young swans were seen on March 4, 1937.

There is no doubt that the species has increased considerably in California over the 25 year period of my observations, but most markedly in its first half. Notwithstanding complete protection, numerous swans are shot annually in California, especially in foggy weather, mistakenly for snow geese. I should not be surprised if the annual toll

from this cause reaches 300 birds, judging by dead and crippled swans observed. Lead poisoning is another factor that unquestionably accounts for many swans' deaths each winter. It appears to have been the cause of the helplessness of a number of apparently uninjured swans seen and caught.

The contents of the stomach of a juvenile Whistling Swan (no. 1354) confiscated December 13, 1931, by the Division of Fish and Game from a hunter eight miles north of Colusa, provide insight into the species' local food habits. As determined by the Bureau of Biological Survey, same consisted wholly of vegetable matter, principally *Potamogeton pectinatus,* plus 40 per cent gravel. Ground up vegetation, probably stems of this plant, comprised 26 per cent; ground up seeds, 8 per cent; and 541 whole seeds, 65 per cent of the food bulk. Visual evidence has indicated that rice and, to a lesser extent, barley from stubble are frequent items in swans' diets. Crop depredations appear to be rare.

Branta canadensis canadensis. Canada Goose. This species breeds commonly in northeastern California (Moffitt, Calif. Fish and Game, vol. 17, 1931, pp. 20–26). Subsequent field observations indicate that the bird's normal breeding range closely parallels the summer range of Rocky Mountain Mule Deer in California (see map, Calif. Fish and Game, vol. 20, 1934, p. 54). Thus, Canada Geese have been found nesting west to Meiss Lake, west of Macdoel, Siskiyou County (20 pairs observed April 27, 1931); near Big Spring, Shasta Valley, Siskiyou County (Game Warden F. R. Starr, *in litt.*); north of McArthur (50 pairs estimated nesting, May 3, 1931); and near Burney (10 pairs estimated present, July 2, 1931), in Shasta County. Also, west to Mill Creek Homesite, Tehama County (a pair, June 20, 1931), and in Sierra Valley, Plumas County; south regularly to the southern end of Lake Tahoe (over 40 adults present April 18, 1931). Mr. James B. Dixon writes that it occasionally breeds at Mono Lake, Mono County.

Only about 25 pairs were estimated to be nesting about Tule Lake, Siskiyou County, April 25, 1931, when, according to State Game Warden F. R. Starr, twice this number nested on Sheepy Lake, the remnant of Lower Klamath Lake. Modoc and Lassen counties comprise the species' breeding metropolis in California. Practically every small lake with swampy borders, or marshy area, is used. Extensive field investigations in these counties in 1931, 1932, and 1933 resulted in the following estimates of number of breeding pairs of geese for each of the more important localities: *Modoc County:* Clear Lake 25, Goose Lake 25, Surprise Valley 100, Warm Spring Valley 40, Jess Valley 20, South Fork Pit River Valley 200, Egg Lake 10, Big Sage, Doris and other Modoc County reservoirs 75. *Lassen County:* Big Valley (near Bieber) 40, Ash Creek Valley 20, Dixie Valley 20, Grasshopper Valley 5, Poison Lake and vicinity 10, Eagle Lake 20, and Honey Lake Valley 200. It is evident that the last mentioned locality and Surprise and Pit River valleys of Modoc County are important breeding grounds. A good many Canada Geese also nest on Lake Almanor and on other lakes and reservoirs in northeastern Plumas County.

As a result of the above investigations it was concluded that based upon conservative estimates no less than 1200 pairs of Canada Geese breed in California annually. It is thought that the progeny of these birds, about 4800 young ones, represent considerably more individuals of the subspecies than are bagged annually by the State's gunners.

Occasionally, Canada Geese may nest well outside of their normal breeding range. The instance (Bird-Lore, vol. 35, 1933, p. 112) of Canada Geese nesting on Crystal Springs Reservoir, San Mateo County, in the spring of 1932, was partially verified by me in August, 1932, when twelve individuals were observed on the lake.

Canada Geese are partially resident the year around on their California nesting grounds. That is, of the breeding population, some remain throughout even the severest winters, more in mild ones; while others migrate southwestward to the Sacramento and San Joaquin valleys in mid-winter. Here, their numbers are augmented by migrants from farther north, so that the species is a fairly common winter resident over much of the temperate northern three-fourths of the state, exclusive of the northwest coast region where replaced by the White-cheeked Goose, *Branta canadensis occidentalis* (see Moffitt, Condor, vol. 39, 1937, p. 159).

In some favorable areas Canada Geese are locally common winter residents. These include the rolling hills intersected with creeks bordering both sides of the Sacramento Valley where the birds are to be found in numbers regularly in winter, as east of Marysville and Lincoln and west of Willows and Williams. They may then be rare in comparison with the greater numbers of smaller kinds of geese so abundant on the floor of the Valley. In unusually cold weather, Canada Geese become common in the valleys, when they are presumably frozen out of their more favored, elevated wintering grounds. From Tomales Bay, where positively identified December 31, 1932, and December 28, 1938, southward, Canada Geese are sometimes found in mid-winter on salt and brackish water, more frequently on fresh water close to the sea. Of late years, at times up to 500 geese have been wintering at the south end of Crystal Springs Lake, San Mateo County, where seen on Christmas days of 1936 and 1938, and on numerous other occasions. That the species still ranges as far south as San Diego County, is attested by a photograph (Pacific Sportsman, 1934, p. 14) of a hunter holding three unmistakable Canada Geese stated to have been killed in that county in November.

Canada Geese are apparently hardier than Whistling Swans and a considerable number of the former, as stated, winter in northeastern California. Worcester (MS) found about a thousand present at Tule Lake on his arrival, September 16, 1931. This number gradually diminished until not more than 50 were in evidence on December 31. The same observer states that about 300 geese wintered in 1932–33 on Tule Lake and on Clear Lake, Modoc County; also, that others wintered on Sheepy Lake, several hundred being observed on Sheepy Creek, February 4, 1932. The next day, Worcester found evidence in the snow of coyotes having killed several Canada Geese along Willow Creek, near Clear Lake, Modoc County. His notes for January 2, 1933, advise that all waterfowl, save 200 Canada Geese, had by that date left Tule Lake. On January 17, he saw no geese, but on the twenty-third, 38 were observed flying high overhead. February 7, 1933, Canada Geese were heard over the Refuge, and on the 13th, small numbers were observed there; but on the morning of February 19, 1500 birds, evidently arrivals during the night, were found present. Approximately 1000 Canada Geese remained on Tule Lake during the ensuing month (Worcester MS). At Tule Lake on March 17, 1933, Dr. Phillips and I saw fully 700 Canada Geese, of which at least 40 mated pairs observed were thought to represent birds about to nest locally. The next day, about 20 mated pairs were similarly noted along the South Fork of Pit River, Modoc County.

In Honey Lake Valley, I found between 300 and 400 Canada Geese wintering near the hot springs at Wendel and Amadee on January 26, 1932. These birds fed in grain stubble that was not solidly blanketed with snow and roosted on the ice near the hot springs, whence they secured water. According to Murphy (MS) migrant geese did not arrive at Honey Lake until February 6, 1932, in heavy flights on that and the two succeeding days. Winter broke overnight on February 9. Canada Geese

were observed beginning to pair off on March 8, 1932, and by the 22nd, nests contained incomplete sets of eggs.

In the fall of 1932, most of the waterfowl, including many Canada Geese, left Honey Lake Valley following a blizzard on December 9. There ensued a month of the coldest weather recorded for California, with temperatures as low as 30 degrees below zero at Wendel; nevertheless about 200 Canada Geese remained throughout the winter. In mid-January, a Canada Goose was caught that had a large piece of ice frozen to its tail. The first migrant Canada Geese returned to Honey Lake Valley on February 5, 1933. The cold weather broke on February 12, and ice left the sloughs on the 23rd (Murphy MS). March 10, 1933, Dr. Phillips and I observed over 500 Canada Geese in Honey Lake Valley, and the next day, about 30 mated pairs. March 16 and 17, 1934, I found mated pairs of geese to be common; several incomplete sets of eggs were observed and one of six eggs was thought to be a full clutch.

Mr. A. L. Brown of Litchfield, who is employed by the State Division of Fish and Game, advised by letter that the cold winter of 1936–37 was the hardest on waterfowl in many years. In mid-January, there were two feet of dry snow on the ground, temperatures as low as 32 degrees below zero, and open water only around the hot springs at Wendel and Amadee. About 350 Canada Geese and 800 ducks were wintering here. By January 15, 1937, many of the birds had become so weakened that they could not fly, so Brown commenced feeding them grain. Feeding was continued until February 12, by which date there were approximately 1500 Canada Geese and 800 ducks present, all in good condition. The failure of the ducks and geese to migrate to more favorable environment with the advent of critical conditions is similar to the case of Mallards in Alberta reported by Rowan (Proc. Boston Soc. Nat. Hist., vol. 38, 1926, pp. 161–163, and elsewhere). His explanation that physiological condition of the birds, governed by photoperiodism or effect of daylight upon the gonads and migratory urge, makes migration under certain conditions a physiological impossibility, even though it may be a physical possibility, appears to be a plausible theory that probably applies to the ducks and geese wintering in Lassen County.

California Academy of Sciences, San Francisco, California, March 14, 1939.

A PLEISTOCENE EGG FROM NEVADA

WITH ONE ILLUSTRATION

By ALEXANDER WETMORE

The remains of eggs are so rare in fossil deposits that their occurrence is always of interest. Mr. Harry E. Wheeler, Assistant Professor of Geology in the Mackay School of Mines, University of Nevada, Reno, Nevada, has forwarded to me for study a most unusual specimen of this kind, consisting of the shell of approximately one-half of an egg of good size embedded in a cone of dendritic tufa. According to data supplied by Professor Wheeler this was found in 1934 by Mr. Ott F. Heizer of Lovelock, Nevada, on the extreme upper shoreline of Lake Lahontan, on the east slope of Lone Mountain, about three miles west of Lovelock, Pershing County, Nevada, at an elevation of about 4400 feet. The age is considered to be Pleistocene. The specimen is recorded as University of Nevada, Mackay Museum Paleontological Collection No. 1003, from U. N. loc. 27.

The egg apparently was deposited under water beneath a large cone of dendritic tufa, after which a second cone formed on the upper part of the egg to grow upward to attach to the under side of the larger cone. This second cone covered approximately the upper half of the egg, protecting that part of the shell so that it has been preserved while the free portion below has been broken away and lost.

The specimen measures about 63 mm. in length by 38.5 mm. in width. These dimensions are only approximate because of the breakage to which the egg has been

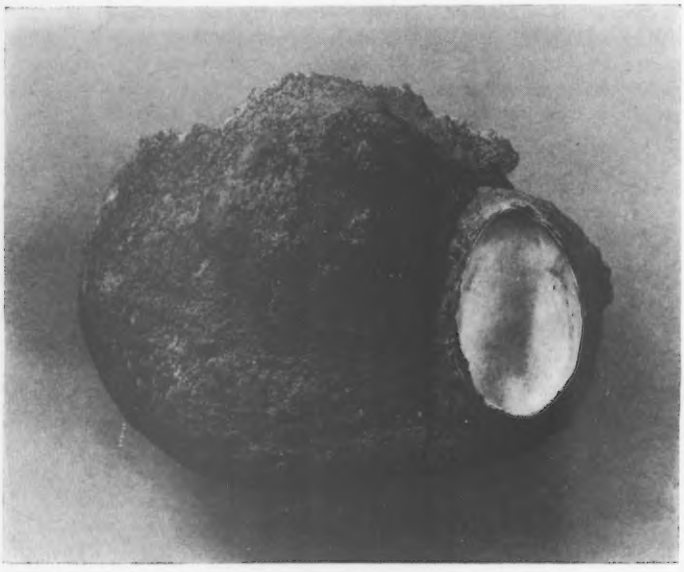

Fig. 29. Fossilized egg shell from the late Pleistocene of Nevada (about one-half natural size).

subjected, but are believed to be close to the original size. The specimen is elongate ovate in form. (See fig. 29.) The shell is well preserved and measures .3 mm. in thickness. The external surface where exposed is pale olive buff in color. On the inner surface at several points, particularly in one narrow, irregular band extending longitudinally along the distal third of the large end, are irregular, roundish spots of small size that seem to me to represent adventitious stains rather than the remains of shell markings. They are dull grayish in color. The shell is firmly held in a surrounding matrix to which it is closely bound for most of the circumference. At one point it was somewhat loose so that a small area of the external surface of the egg was freed for me by the skilled hand of Mr. Norman Boss, so as to allow examination.

The shape and texture of the shell are such as to leave no doubt in my mind that the specimen is actually the egg of a bird. Beyond this it is possible to speak only in supposition. The specimen may represent the egg of a bird of unknown family, or may come from a family group in existence today. The first proposal seems improbable as the appearance of the egg is such as to suggest a modern type, probably one of a group found in the Great Basin today. On this basis comparison has been made with eggs of living species of comparable size that range in that general area at the present time. These include the following: Western Grebe (*Aechmophorus occidentalis*), Farallon Cormorant (*Phalacrocorax auritus albociliatus*), Black-crowned Night Heron (*Nycticorax nycticorax hoactli*), Pintail (*Dafila acuta tzitzihoa*), Marsh Hawk (*Circus hudsonius*), Sage Hen (*Centrocercus urophasianus*), American Coot (*Fulica americana americana*), Franklin Gull (*Larus pipixcan*), and American Raven (*Corvus corax sinuatus*). The Pintail has been selected as representative of the family Anatidae of which a number of species nest in this area.

After a careful examination of eggs of these species with the unaided eye, with a large magnifying glass, and with a low power binocular microscope, the resemblance of the fossil is closest to the egg of the Cormorant. The egg of the Western Grebe is similar in form but has the external surface of the shell smoother, with numerous microscopic pits located in minute, longitudinal depressions. The shell surface in the Cormorant, where free from an overlying investment of the calcareous material which in whole or in part covers the external surface of the egg in this group, is found to be somewhat irregular, with scattered pits. The limited area of surface in the specimen under study is of exactly the same type. It is possible, therefore, that the egg was that of a species of the cormorant family (Phalacrocoracidae), though it must be pointed out again that this is merely supposition and that definitely diagnostic characters are not present.

United States National Museum, Washington, D.C., February 25, 1939.

THE RELATION OF SOME OBSERVATIONS UPON PREDATION TO THEORIES OF PROTECTIVE COLORATION

By JOHN E. CUSHING, JR.

The colors of animals often harmonize with the colors of their environment. Many attempts have been made to explain this fact, of which the theory of protective coloration is most widely accepted today. This explains the resemblance of the colors of animals to those of their environment by saying that such coloration either assists animals to escape enemies or to catch prey. Although the theory tries to tell why organisms are so colored, it does not say how these colors may have been achieved. Additional theories have been offered as an answer to this question; of these, all but one have been rejected by most students.

This theory explains protective coloration (as we shall refer to this general subject) as the result of the natural selection of genetic mutations. The operation of this process is well described in the words of Shull ("Evolution," McGraw-Hill, 1936, p. 166). "Predaceous animals are supposed to pass by those individuals whose mutations lead them to be less conspicuous, or more like some uninteresting object, and to concentrate their attacks on the ones which they readily perceive. Accumulation of these concealing or deceptive mutations as rapidly as the latter occur should lead to what has been called protective resemblance. This concept thus rests heavily on escape from enemies as one of the great necessities of life."

Consideration of these two correlated theories brought up the following questions which this paper attempts to answer. Under what conditions would the identity of an animal be concealed? What methods are used by raptorial birds to hunt prey and what methods are used by prey to escape enemies? Do the methods employed fulfill the conditions under which protective coloration would be effective? What probability do the answers to the above questions give to the actuality of protective coloration and its origin through natural selection, at least as far as the animals studied are concerned?

Before continuing, the matter of the anthropomorphic basis of the theory of protective coloration should be discussed. This is the assumption that the animals studied have a sense of sight very similar to our own. If this is not assumed, the theory possesses no credibility at all, for a color that to us appears to be harmonious with its surroundings may not appear so to another species and we have no criteria upon which to base the theory. Evidence either favoring or discouraging this assumption is at present too fragmentary to approach actuality; we must therefore arbitrarily decide for ourselves whether we favor this view or not. As a denial of the point would leave no basis for the theory of protective coloration, and as many people do favor such a theory, the author feels justified in interpreting the included animal behavior, as far as vision is concerned, in the light of human experience. This should be borne in mind.

We return to the question of the effective conditions for protective coloration. Reflection shows that creatures would be deceived by protective coloration when such colors cause the identity of an organism to be misinterpreted. If the properties characteristic of a particular form were also characteristic of its background, the whole would appear as a homogeneous unit to an observer. This homogeneity would break down, however, as soon as other properties were introduced that would be recognized as peculiar to the animal—distinctive characteristics that the animal possessed, but that

its environment did not. By far the most important of these is the property of motion. A moving animal is easily recognized as such against its background. This matter will be considered in detail later on.

The answer to the first question, therefore, is that the identity of an animal is concealed when the animal does not show any characteristic feature by which it may be distinguished.

This brings us to the problem of ascertaining the methods of attack and defense employed by various organisms, the solution to which is to be derived from the evidence of field studies. These studies, of my own, were confined to bird predators, chiefly hawks, and their prey. Most of the observations were made in the spring of 1937 in connection with a course in vertebrate zoology given by Joseph Grinnell, of the California Museum of Vertebrate Zoology, Berkeley. The work was done chiefly on Tomales Point, Marin County, California, and in the hills back of Berkeley. A scattering of notes from other places and of other dates also has been used. The organisms studied are described under two group headings: Those that hunt and those that are hunted. Only those facts, ascertained by actual observation of one or more cases and that appear to be of general application to the problems involved, will be described. The work was aided by the use of a pair of eight-power binoculars.

PREDATORS

Western Red-tailed Hawk. *Buteo borealis calurus*. These hawks were observed to hunt mostly by perching upon a suitable bush, post or tree that was elevated above its surroundings and commanded a good view. Sometimes birds were seen to be soaring high in the air acting as though they were hunting. The sedentary hunters usually faced down hill, or else into the wind, if it was blowing, and often had their backs to the sun.

Once perched, they maintained a close watch over the vicinity as indicated by head movements and their general attitude. A good place may be held for five hours or longer, although the individual perch may be shifted from time to time. The activity of individuals was determined by numerous factors, including the presence of prey. Hawks were seen to fix their attention upon a particular spot, or prepare to leave their post and then relax, or to sail swiftly out and strike, or to perform any variety of movements which indicated all degrees of interest in food animals, from merely watching to actual catching of them.

Hawks were to me, as observer, conspicuous upon their perches, especially when the sun shone on their white breasts. This did not appear to interfere with their hunting, for they often struck at animals within a few feet of them. Further, I was surprised at the distance to which hawks sometimes flew to strike. One hawk did this at an estimated 175 yards; others at distances well over 100 yards. This would indicate that, even if a motionless hawk were visible as such to small animals, the hawk would be able to see them farther than they could see it.

Two Red-tailed Hawks were observed diving almost directly toward me with closed wings. In both cases they were difficult to see and their forward motion hard to judge, not, as Thayer ("Concealing Coloration in the Animal Kingdom," Macmillan, 1909, pp. 10 ff) would have it, because of the barring on their ventral surfaces, for this was not visible, but because in head-on view they were extremely thin and their line of movement offered no points of reference to surrounding objects. This same phenomenon was observed in the dive of a Sharp-shinned Hawk (see below). Two other hawks were especially noted as examples of a far from unique situation. These appeared as dark

shapes against the sky while diving toward the ground. No coloration whatever could be detected.

Several times Red-tailed Hawks were seen to strike into the grass with their feet and then to stamp vigorously about the place, which indicates that though their prey may be partially hidden by the grass and hence hard to see, yet it may be sought after and taken. To quote from my notes a favorable case that supports this conclusion: "I saw him just after he landed and he moved his feet actively and bent his head down. He raised his head and I saw a small mammal swinging by its tail from his beak. White underparts, dark above, size of a mouse. . . . At place where mouse was caught was a runway through the grass, continuing as a covered path into a dead iris patch. Several drops of blood were to be seen near the edge of the patch and a few loose iris stems with fur on them. From the looks of things the hawk grabbed the mouse while it was under the iris. . . ."

At this same place many White-crowned Sparrows were feeding and moving about, showing that the hawk had discriminated between the two types of organisms. While quantitative data at present are lacking, my observations indicate that much more prey is seen and struck at than is captured. This point is interesting, but hardly can be used to support or deny any of the hypotheses in this paper.

The Accipiters. *Accipiter cooperii* and *A. velox*. Differentiation between these species in the field is often uncertain and for this reason the two are considered here as representing one type of predator. No doubt there are differences in their behavior, but these should not be significant in the present connection.

A hunting accipiter either perched well concealed in the foliage of a tree or bush and from there attacked unwary animals, or flew rapidly along, taking advantage of intervening objects to conceal itself, and attempted to fall upon its prey before the latter could escape. Observations showed the accipiters to be more active than Red-tailed Hawks, seldom remaining long at one station, but rather, moving from place to place, carefully searching each area. This may have been a consequence of the game they hunted, which is in general more active than that of the red-tails and thus could have been detected sooner.

A hawk that perched near the author on the edge of a wood overlooking an open area came there through the trees, possibly to avoid being seen by birds that would give an alarm. The hawk actively looked over the open land before it, even looked over its shoulder into the woods behind it, and once watched something intently in a gully. After eight minutes it flew out of sight. Whether or not the bird was conscious of using the woods to conceal its approach, small birds are acute at seeing these hawks flying over the countryside and have been heard to utter cries of alarm even though their enemy was well over 100 yards away and obviously not hunting them.

Once a hawk, probably a Sharp-shinned, dove toward the writer, intent upon a flock of White-crowned Sparrows close at hand. As in the case of diving red-tails, it was moving head first with its wings close to its body and was hard to see. Again, lack of perspective was responsible for this deception and not ventral coloration, which could not be seen.

Miss Elizabeth Over and Miss Lillian Halstrom were eye witnesses of a successful attack upon two juncos, and the author is indebted to them for the use of their notes on the subject. The two birds were clearly taken by surprise, the hawk diving very quickly from a near-by tree to seize one before it was able to fly off. From this and other observations, it seems that the victims are usually taken by surprise, the effectiveness of which may be aided by the swiftness of the hawks.

Sparrow Hawk. *Falco sparverius*. In the Tomales Point area the Sparrow Hawk chiefly takes insects. These were hunted by a bird's perching on rock piles or posts in open fields or by hovering at a varying distance above the ground and watching the terrain below. When an insect or other food was seen, the bird dropped gracefully down and seized it, often diving head first with partially closed wings. One bird was seen to flutter over an area of bunch grass about twenty feet up and then to drop with outspread wings, checking and controlling its flight as though to land at a desired spot. However, when it did land, it did not appear to catch anything. Such action may be interpreted in favor of the hypothesis that barred wings act as a camouflage (Thayer, *op. cit.*, p. 80). However, as Sparrow Hawks hunt in the open, their background in such cases is the open sky, not a criss-cross of branches, and conjecture is the only evidence upon which it could be claimed that ventral barring was protective (or "concealing") under these conditions.

Duck Hawk. *Falco peregrinus*. A favorite hunting trick of this bird was to fly to a considerable height above a suitable place and from there to watch for game moving below it. These falcons possess keen eyesight and remarkable powers of flight. These faculties enable them to fall with great swiftness upon unsuspecting birds half a mile or more away. When such an attack is launched, the falcon moves like an arrow and the only escape open to its victim is that it dive under water or dodge. There is little chance that the coloration of the Duck Hawk aids it in hunting. If seen while far away, it appears as a speck against the sky; more closely, as a blurred dark shape, moving with a speed demanding instant action, occupying too much of the visual field to be hard to see.

Apparently these falcons kill both moving and stationary birds, either by knocking them down or by seizing them bodily. The author has heard eyewitness stories of Duck Hawks seizing wooden decoys and of one killing and then retrieving a swimming duck. A flock of Ruddy Ducks were passing over the water close to the writer's boat when a falcon seized one and bore it to a beach.

Duck Hawks were often seen hunting in the evening, watching the bay surface from the air, with the setting sun at their backs. This is a trick well known to wartime aviators, but whether the hawk employed it intentionally or not is hard to say. A clam digger told me that he had seen them hanging in the deep shadows of a hill adjacent to the estuary and watching the water from there. Again the question of intent is not answered.

Marsh Hawk. *Circus hudsonius*. Marsh Hawks characteristically hunt by flying over open country quite close to the ground, often only five to ten feet up, and watching below them for suitable prey. Sometimes a hawk appears to follow a definite beat, passing at intervals over the same stretch of territory. When food is seen, the "harrier" drops and tries to seize it, apparently depending upon the suddenness of its appearance to catch the victim off guard.

A male Marsh Hawk, flying about five feet above the ground over some brush, checked its flight and extended its legs over a bush as though it saw something. Immediately it alighted on the bush and looked about. Suddenly it jumped to the ground on the far side of the bush; then back to the top. Then it hopped into the air and dove at the bush with its legs extended, only to repeat the same action at another point. Finally it drove down hard into the center of the bush and came up with a small rabbit, which was carried squealing over a gully to the ground.

Bent (U. S. Nat. Mus., Bull. 167, 1937, p. 87) records that: "Eugene S. Rolfe (1897) noted the following interesting attempt to secure a meal: 'Many times I have watched the Marsh Hawk sailing low and keenly scanning the ground on the open prairie, and suddenly pouncing down and quickly ascending again with an empty mouse

nest in its talons, and on one occasion I followed behind for fully 2 [sic] miles and in that distance it picked up and dropped seven of these empty nests. On examination, they proved to be simply wads of fine dried grasses, and it was easy to see that if these had all chanced to be occupied by families of young mice, the foray of that particular hawk would have been most fruitful in the destruction of these small pests.' "

These two instances show that the Marsh Hawk is capable of complex reactions when hunting and that its sight must be keen in order to detect mouse nests while moving through the air.

The dichromatic plumages of the adult sexes (plus the less contrasting, but distinct, plumage of juveniles) show that in this species coloration can hardly be a factor involved in the capture of prey. Here are two quite different color patterns existing under identical conditions of hunting. If one is concealing, the other must also be so, even though they are in contrast to each other. This being so, success in hunting appears not to be affected by the color of the birds. The case is similar to that seen in the color phases of the Arctic fox and other animals.

Great Blue Heron. *Ardea herodias.* Great Blue Herons regularly come inland to the grassy hills on Tomales Point and hunt gophers, mice and other creatures. The author has not actually seen gophers caught, but has talked to ranchers who have. However, the following things have been noted by him. Herons were found to be standing in places where fresh gopher diggings were present and where the grass appeared too short to support meadow mice. At such a place, a heron was seen to watch one spot intently and to stalk forward, now swiftly, now slowly, just as though a gopher were being hunted.

In such hunting, the advantage would be the heron's, which only has to see a slight movement of earth or the briefest appearance of the gopher to become alert. There is evidence to indicate that gophers disregard motionless animals. The heron's method of hunting is similar to that of the various hawks, in that it watches for its prey to expose itself and then tries to fall upon it before escape is possible.

Owls. Observations on owls that were hunting are not extensive. However, a few were made that are of interest. A Great Horned Owl (*Bubo virginianus*) was seen at night perched upon a telephone pole, silhouetted against the sky. He was there when first seen and remained for at least ten minutes. This behavior suggests that of Red-tailed Hawks and Sparrow Hawks when hunting.

Both Great Horned and Barn owls have been seen flying at night. In every case they were silhouetted against the sky, even at times when the moon was shining. In view of this, the fact that Great Horned Owls of the desert are lighter in color than those of the coast can hardly be explained by the theory of concealing or protective coloration, at least as far as food getting is involved. There is no chance for color variations to be detected in black silhouettes.

Barn Owls have been attracted by the author's squeaking like a mouse, but this does not necessarily mean that they hunt by ear as well as by sight, for even small birds and deer will be attracted in a similar way.

PREY

We now turn to the animals that comprise the bulk of the food of the predators. How do they escape their enemies?

Cottontail and Brush Rabbits. *Sylvilagus audubonii* and *S. bachmani.* These species are considered together because of the writer's inability to distinguish them easily in the field. Many observations show that these two species of rabbit rely upon their ability to dash into cover for protection from their enemies. Their general pattern of behavior

is to feed in grassy places, often several feet from the nearest brush. When feeding, they are constantly alert as shown by their reactions to indications of possible danger.

In all cases, rabbits that were really alarmed made an instantaneous dash for cover, and in no case did they resort to "freezing." Freezing, often mentioned in many connections, deserves special comment. The writer has noticed in hunting with bow and arrow, and at other times as well, that a rabbit, not quite certain as to his intent, will sit very still in the attitude called freezing. However, when really alarmed by too close an approach, a sudden movement, or a striking arrow, freezing is supplanted by instant motion toward the nearest brush. These observations indicate that freezing is in reality the stopping of normal activities in order to ascertain the extent of an uncertain danger and to prepare for flight should it become desirable.

The reliance these animals place upon running to cover was further emphasized by observations upon individuals unaware of the writer's presence. These rabbits were busily feeding and when not in motion were often hard to see due to their protective coloration. However, they seldom remained stationary for more than a minute or two, with the result that they were identified easily as small mammals whenever they moved. Any hawk watching the area in which they were feeding would have had no difficulty in detecting them. The rabbits themselves placed no reliance upon freezing as a protective device when alarmed. Invariably, they ran for cover. Among other things, the alarm notes of various species of birds were enough to cause an instantaneous movement into the brush.

The coloration of any one rabbit was not always constant to the eye, but varied with the animal's position in relation to the sun, shade, color of background, and other physical factors. This shows that slight genetic differences in coat color would often be hard to distinguish in the field.

Jack Rabbit. *Lepus californicus*. Jack rabbits depend for escape from predators upon their speed, which is developed to such a degree that, unlike the other two species of rabbit, they will usually attempt to outrun their enemies rather than seek safety in cover. Often when lying in their forms, these rabbits are impossible to see unless or until they rush out. Although such hiding will protect the creatures from a man, it can not be employed against avian enemies that may be hunting the area. Sooner or later the rabbits must move about and feed, which at once makes them conspicuous to any hawk that is patiently watching the region.

As is the case for many kinds of wild game, jack rabbits can be closely approached by a man by exercising every faculty necessary to insure a silent, slow advance, even though the hunter may sometimes be partially or wholly exposed. This and the fact that these and other animals often do not notice motionless humans even when in full view, show that moving predators are more easily recognized than stationary ones.

The following field notes of mine may have some bearing upon Thayer's "Law of Concealing Coloration": "While walking at dusk, I saw a jack rabbit crouched on the edge of some brush in a plowed field and was struck by the way in which he stood out from his surroundings. A short time later, I saw another which was similarly contrasted, this time in natural surroundings. He ran, starting two others that I had not seen. All three soon stopped; one was plainly visible, but the other two were hard to see. The one that was visible was facing so that his flank received the full strength of the fading light. I could not definitely see how the other two were facing, but they appeared to be in the shadow of a hill. From these observations, it seems that Thayer's Law is not effective when the light strikes the animal from the side, as was the case of the two visible rabbits. (In these the light underparts were to be seen clearly.) This result is

natural to expect from the working of the law." This observation may have a direct bearing upon early morning and evening hunting in that animals are more easily seen at such times. However, such a possibility is at present only a matter of conjecture.

California Ground Squirrel. *Citellus beecheyi.* The reactions of the ground squirrel to danger may be said to be stereotyped, so similar are they in different individuals. The animals feed at varying distances from their holes, and, at the slightest alarm, dash headlong back to them. Once the safety of the burrow is gained, the squirrel's actions are conditioned by the type and intensity of danger that threatens and he either vanishes into the earth or remains partly exposed until he considers it safe to begin feeding again. As his main enemy is the Red-tailed Hawk, it is important that he become aware of this foe before it can cut off his retreat.

Pocket Gopher. *Thomomys bottae.* Gophers live underground but tunnel to the surface in order that they can come out to feed upon the surface vegetation. If alarmed when out of their burrows, they often shoot backwards into their holes so fast that they appear to be drawn by strings. Gophers (and moles also) may create quite a disturbance while excavating earth and yet not be visible themselves. Such operations should be as visible to a waiting heron as they are to man. Dawson (Birds Calif., vol. 4, 1923, p. 1890) says that herons often transfix fish with their beaks, intimating a spear-like action; so it is plausible that gophers could be similarly treated even though covered by a few inches of loose earth. This remains to be seen, but in any case it is apparent that the bird could locate its prey without even seeing it and be in readiness to seize it when it came out.

Cameron (Auk, vol. 31, 1914, p. 159) gives direct evidence of such action in the case of the Ferruginous Rough-legged Hawk. He quotes Sullivan: "I have watched the hawks often through glasses in our alfalfa field after the first crop has been taken off. The pocket gophers get pretty busy tunneling, and pushing all the loose, damp earth up in piles on the surface. The hawks fly slowly over the field until they discover a fresh pile of damp earth. Here they will alight softly, and wait for the gopher to push close to the surface. They will then spread their wings, and, rising a few feet in the air, come down stiff-legged into the loose earth, when the gopher is transfixed and brought out. I have seen them eat the gopher where caught, and at other times carry it away."

Once, while I was sitting motionless in a meadow, a gopher appeared in a hole not two feet away. It was there for some time, often exposing its body down to its shoulders and could have been struck by a heron or hawk. It did not appear disturbed by my presence. This slight evidence indicates that a stationary predator would have been similarly treated.

Fresh gopher hills are easily seen in their undisturbed surroundings from quite a distance and could well serve as an indicator of possible food to interested predators (for example, Ferruginous Rough-legs). With fresh mounds and actual digging operations serving as secondary clues to the presence of gophers, their danger lies in coming up at a time when an enemy is watching for them. Under such conditions, coloration (with the possible exception of violent contrasts) would make little difference to the animal's security; for ample opportunity would be given the hunter to see it when it moved into view.

Mice and Rats. Inasmuch as notes on various species of rats and mice are not plentiful, they will be considered together. Meadow mice (*Microtus californicus*) are numerous over the entire area studied. Often while I have been hunting other game, and moving very quietly, they have been started in the grass. Invariably the mouse appeared as a dark brown streak flashing into the nearest cover along its runway. This suggests a

similarity in behavior to the small rabbits, but further statements than this would be pure conjecture.

Three wood rats (*Neotoma fuscipes*) observed in an abandoned cabin at night invariably hid in holes or under debris when alarmed, their plan of escape again being to seek cover. Deer mice (*Peromyscus*) act in the same manner.

One overcast day, the author and his brother accidentally walked into a colony of Point Reyes jumping mice (*Zapus orarius*). They were in dry, dense grass on a steep slope and at least seven or eight were started in a fifty yard radius. These gave two or three leaps and vanished into holes in the earth. Again their idea was to get away and hide.

The small evidence at hand suggests that, in general, rats and mice, when frightened, behave in a manner similar to that of the other mammals which have been studied more carefully.

Waterfowl. This name includes in this instance the species chiefly attacked by Duck Hawks. A grebe (species uncertain) was seen to escape the stoop of a Duck Hawk by diving from full flight straight into water ten feet below. An old hunter at Point Arena, Humboldt County, California, said that old time duck shooters never killed the Duck Hawks that frequented nearby lagoons, for these birds forced ducks down onto the water where they risked being shot to avoid the falcons. Accounts in various ornithological books support the fact that ducks frequently escape their enemy by hastily landing upon any body of water that may be available. Probably some birds are able to escape by dodging, but the author has not happened upon any evidence for this.

In any case, a duck's real danger lies in not seeing the falcon until too late to avoid its blow, however this may be done. This was the case with the Ruddy Ducks previously mentioned. The birds, skimming over the water, were apparently not aware of the hawk until he seized one and carried it off.

Miscellaneous Birds. The following notes were selected because of the relation which they bear to the hunting methods of accipiters. White-crowned Sparrows, when scared by a hawk, did not freeze, but flew in a body to the nearest cover. This same reaction is true of Golden-crowned Sparrows, juncos, and many other small birds. Whenever an accipiter is seen, the birds at once begin a distressed chipping which is taken up by all in the vicinity, and causes even rabbits to take cover. The birds are adept at seeing hawks at distances well beyond any chance of an unpleasant encounter. This means that the only way a hawk can catch small birds is to take them by surprise before they can reach safety. This implies that the hawk must see them first, before they are aware of its presence and when they are moving about feeding, thus rendering their protective colors ineffective.

DISCUSSION

Basic similarities are revealed by comparing the hunting methods of various predators. The first of these is their common necessity, that of finding prey. As far as present facts show, this is accomplished in essentially the same way by all the birds studied. Every species of hunter makes an ambush of some type and watches for animals to expose themselves by moving about. The high-flying of the Duck Hawk, the hidden perch of the accipiter, the rock pile of the Red-tailed Hawk, are all modifications of this general scheme. Even the active Marsh Hawk, suddenly appearing over some clump of brush, employs but another modification of the general plan.

Not only does this "watchful waiting" cause an unsuspecting animal to give itself away by moving about, but it also allows the hunter the best possible chance to catch it. There is sufficient evidence to demonstrate that the birds studied possess the ability

to withhold their attack until a suitable moment arrives. This is shown by the variety of actions performed when prey is in sight: By the ability of some birds to discriminate between uncatchable and catchable prey, as in the case of a Red-tailed Hawk not molesting sparrows but seizing a mouse beside them; by the mouse nest investigations of Marsh Hawks; and by other activities elsewhere discussed. Obviously, a hawk's chances for success are greatly increased if it chooses the best moment for attack.

Hawks are aided in their work by a remarkable eyesight that enables them to watch unseen from places sometimes conspicuous, far beyond the vision of their intended prey. The predators here studied, then, universally use the method of watching for their food from "ambush," which allows the prey to reveal itself in moving about and gives the hunters more chance to launch a successful attack and to take their prey by surprise.

The animals that are hunted have, in turn, a general method of escape that is adapted to the habits of their enemies. They maintain a constant vigilance and, when threatened, spring into action, either dodging or dashing to cover. No other method would be effective against an enemy that keeps hidden until prey is carefully marked and then falls swiftly upon it, knowing its exact position. To remain motionless would be fatal; all the victim can do to escape being struck down is to run. As in the case of the hawks, various modifications of this general plan are executed: The cotton-tail rabbit takes to the brush, ducks dive under water, and gophers and ground squirrels hide in their burrows in the face of danger.

A fact observed on Tomales Point, but best expressed by Brewster ("October Farm," Harvard Univ. Press, 1936, p. 108), supports the generalizations just laid down. "Of one thing I am convinced, viz., that nearly if not all our birds of prey including the Shrike lack *persistence* in the chase . . . ." If surprise is as fundamental a necessity to success as it seems, there is reason not to expect hawks long to follow up an attack that failed at its onset.

Furthermore, the conclusion of McAtee (Smiths. Inst., Misc. Coll., vol. 85, no. 7, 1932, p. 144) that food species are taken in proportion to their numbers irrespective of protective coloration agrees with the fact that predatory birds hunt by watching a given area for food. With this the case, one would expect the more numerous species to be seen moving about, and thus subject themselves to attack more often than the less numerous ones, and therefore to be caught more frequently.

To summarize, the answer to the question concerning methods of escape and capture for all the species observed is this: A predator watches promising terrain and soon sees any animal in it that moves. Waiting for a suitable moment, and knowing exactly where the animal is, the hunter attacks, taking it by surprise. The prey, if it sees its enemy in time, tries to escape by dodging or taking to cover. This seems a general relationship, at least in the animals studied.

It may now be asked if the colors of animals, blending as they do with those of the environment, are of any significance in such a scheme. In other words, are the conditions under which protective coloration would be effective fulfilled in nature? First will be considered the relation of motion to the problem. Admittedly, the colors of many animals are such as to render them inconspicuous in their natural environment when they do not move. This can be verified by anyone who has watched and hunted animals at all and is, in fact, the main basis of the theory of protective coloration. However, as soon as the animal moves about, it assumes a new property and one sharply distinct from those of its otherwise similar environment. This is easily proven in several ways, some of which are as follows: First, by the rapidity with which we see a creature, previously overlooked, when it flies or runs; second, by the certainty with which we identify a

stationary object as living the moment it moves; third, by the difficulty we have in seeing, for instance, a small bird in a tree during a wind that causes the leaves to move.

We now come to a very important point: The characteristic movement of an animal seen against a still background shows with no doubt that it is a *living organism* irrespective of its color. Observations on many kinds of animals also prove this in several ways. Moving birds can be identified as living creatures of a certain size at distances far exceeding those at which their specific coloration can be made out. When hunting birds and mammals, they are easily located when seen moving, even though concealed or shaded so that their true colors are not determinable. Rabbits dashing away in moonlight are of a far different color than they would be in the day, yet they are easily seen.

Now to correlate these facts about motion with those of the mechanism of predation. Movement, as has been shown, is the only property needed to identify any of the organisms studied as alive. When moving, an animal can be seen though its colors cannot, its size can often be determined, and it can be detected where otherwise it would have been overlooked. A hawk, owl or heron patiently watching a certain territory would sooner or later be able to see any animals present as these unsuspectingly went about feeding or attending to other affairs. There would be no way for the creatures to avoid this consequence except not to move, there would be no reason not to move unless danger threatened, no danger would be detected as long as the enemy remained concealed.

Under such circumstances, a predator need only have patience to wait and to watch (which is what was done by all the predators I studied), to be assured of seeing any suitable prey living within its field of vision, no matter what its color. With conditions like this, the author cannot believe that color plays a part in the detection of prey, at least insofar as the types of animals studied are concerned.

Once seen, however, prey must be caught. Can color be important in this connection? The enemy has its eye upon its quarry, knows exactly where it is, and attacks with the intent of going to it and seizing it. The closer the bird approaches its prey, the larger the prey becomes in proportion to the landscape and therefore the more conspicuous it is. By the time they are near together the victim is of relatively large size; a rabbit, for instance, would be to a Red-tailed Hawk as a medium-sized dog would be to a man. If at this time the animal fails to run, the hawk has merely to seize it; if it does run, the hawk should be as well able to see it as a man could a dog under such circumstances. With this the case, color again seems not to play a part in the outcome of such an attack.

As to predators, there are many facts that are incompatible with the idea that variations in color in any way affect their success in hunting. Some of these are: The contrast in markings between sexes of the same species (as in the Marsh Hawk), the impossibility of seeing the under parts (or dorsal for that matter) of diving hawks, the difficulty of accurately determining the colors of birds seen against the sky or in motion, the hunting over open country by hawks ventrally marked to resemble twig patterns, the conspicuousness of white-breasted hawks not appearing to alarm their prey, the impossibility of determining colors at night, and the great variety of specific patterns that could all be called "aggressive." Once more, the evidence is against the probability that coloration is significant in raptorial affairs.

Because the behavior of predators and prey toward each other apparently nullifies any protective value of the colors of animals, natural selection does not seem to be the process that has developed harmonious coloration in the case of the animals studied. In order for natural selection to operate, color should be a significant factor in predation through aiding some animals and hindering others. This does not appear to happen; therefore, no selection should take place.

There are some matters that at first glance seem to contradict the above statements. The young of numerous animals possess the ability to lie motionless when threatened by enemies; their colors resemble those of their environment in a general way and would appear to protect them from being seen. However, granting that in this case, where specific use is made of "freezing," protective coloration actually works, can we grant further that natural selection evolved such coloration? The author thinks not, for several reasons. There is such a variety of patterns that are protective and these often resemble each other so much that they are not to be differentiated in the field. It appears unlikely that selection could have been the agent that developed these patterns. A more logical action of selection would be, in accordance with the views of this paper, between young that moved and young that did not move, rather than between slight differences of pattern.

The argument has been advanced that, as a black object moving against a black background is harder to see than a white object against the same background, animals which are more protectively colored should be harder to see moving than those which are less so. In such a case, selection would work toward more efficient protective coloration. This would be true were these all the factors; but, in nature, there are others involved.

In the first place, a contrast between some individuals and their environment must occur before selection can take place. In nature such contrasts are seldom seen, either among individuals of the same region or, more importantly, between closely related taxonomic groups. The numerous racial differences that even a zoologist must have right at his hand to distinguish, exemplify the type of difference that actually occurs. A great stretch of the imagination would be required to say that these differences were the products of the type of selection described above. Furthermore, studies in genetics show that a complexity of genes is involved in coat colors generally and that theoretically the gene mutations that are of significance in evolution are usually those of small degree. This does not support the idea that nature provides genetic differences in coat color of magnitude sufficient for them to be acted upon by selection.

Then, in the second place, the method of watching an area soon reveals anything moving in it. Add to this the facts about genetic differences just discussed and the evidence shows the argument using black and white contrasts does not have its parallel in nature.

A matter worth mentioning before passing to the conclusion of this paper is the idea that the selection of slight differences will over a long period of time have effect upon the characters of a species. While this may be so for some genetic characters, it does not seem so in the case of coloration. Slight differences in coloration have here been shown to be non-essential in predation with regard to present cases. Therefore there is no reason to believe that they would be essential over a length of time, which merely serves to augment the number of non-essential cases.

As the evidence all indicates that the theory of natural selection cannot explain why the colors of animals harmonize with those of their environments, another explanation must be sought. The most obvious one is that the external colors of animals are the by-products of their physiological processes and that the resemblance of these colors to their environment is either coincidental or due to causes far more subtle than the theory of natural selection proposes. The similarity in coloration often seen among species living in a common environment, such as a desert or a humid coastal area, does not go contrariwise to the idea of "physiological by-products." These similarities in pigmentation could be the result of parallel adjustments in various physiological mech-

anisms to the same general conditions, no matter how such adjustments were evolved. This is purely conjectural, but the possibility of its being true should not be overlooked until some definite evidence to the contrary is discovered.

An alternative idea is that, while single mutations of the genes affecting coat color may not be of a size to be influenced by selection, these mutations may accumulate and develop a color pattern then of sufficient contrast to come under such an influence. However, if it is granted that mutations can accumulate in such a fashion, this itself could explain the differentiation of specific color patterns and therefore there is no need to invoke the theory of natural selection.

SUMMARY

1. The most widely accepted theories explaining the fact of harmonious coloration are outlined.
2. Four questions are asked:
   a. Under what conditions would the identity of an animal be concealed?
   b. What methods are used by raptorial birds to hunt prey and what methods are used by prey to escape enemies?
   c. Do the methods employed fulfill the conditions under which protective coloration would be effective?
   d. What probability do the answers to the above questions give to the actuality of protective coloration and its origin through natural selection, at least as far as the animals studied are concerned?
3. Question (a) was answered as follows: The identity of an animal is concealed when it does not show any characteristic features.
4. The answer to question (b) was obtained from field observations upon a variety of raptorial birds and their most usual prey. The predators studied universally watched for their food from "ambush," different methods being employed by each species. This allows prey to reveal itself by moving about and greatly increases the chance of a successful attack. The various species of prey, in turn, all maintained a constant vigilance and all sought safety by dashing to cover or dodging. Thus the relationship between predators and prey is based upon two general methods of attack and escape.
5. In answer to question (c) it was pointed out that the movement of an animal seen against a still background identified it as a living organism, irrespective of its color at the time. This fact, correlated with the general method of predatory attack, makes it difficult to believe that color plays a part in the detection of prey, at least as far as the type of animals studied is concerned. Many facts were also shown to militate against color being important to prey in the detection of predators.
6. Because color does not appear to play a significant rôle in predation, it is not probable that the coloration of animals is actually protective (or aggressive). In the face of this, the theory of the origin of such coloration through natural selection does not appear to be compatible with the facts.
7. Some matters have been discussed that at first seem to contradict the above ideas.
8. The possibility was suggested that the external colors of animals are by-products of their physiological activities, and that the resemblance of these colors to their environment is due either to coincidence or to causes far more subtle than the theory of natural selection proposes.

San Francisco, California, February 4, 1939.

PROPOSED SHIFTS OF NAMES IN PASSERCULUS—A PROTEST

By JOSEPH GRINNELL

Following are some criticisms of the paper by James L. Peters and Ludlow Griscom on "Geographical Variation in the Savannah Sparrow" (Bull. Mus. Comp. Zool., vol. 80, no. 13, January [my copy received July 22], 1938, pp. 445–477 [+3], 1 col. pl.). However, let me say at the outset that no systematic bird paper for a long time has so interested me as this one. It is obviously the result of painstaking study, involving a great amount of material; and the group dealt with was already known to be confusingly variable throughout the extent of its continent-wide occurrence; furthermore, its authors are experienced, competent. The problem was a difficult one, and it is handled in sober fashion; the resulting revision is no slap-dash product. *So,* the adverse criticisms I make, and the suggestions I am led then to offer, are not to be inferred as discounting my respectful feeling toward the paper and its authors.

The first unfavorable reaction upon the present reader of this paper (and this same reaction was produced by the reading of Griscom's crossbill paper) results from a certain, seemingly unnecessary, positiveness of statement. Here and there the reader is told a thing in a manner of wording that denies him the privilege of entertaining any other possible interpretation or alternate view! To illustrate: On page 447, Peters and Griscom state: "While the Ipswich Sparrow has been maintained as a distinct species ever since it was first described, there are no reasons [*sic!*] (except possibly sentimental ones) that would warrant the continuation of such a course." And again, page 448: "The fact, therefore, that the Ipswich Sparrow is readily distinguishable from *labradorius* and *savanna,* the only races with which it ever associates, has nothing whatever to do [*sic!*] with a final evaluation of its relationship to the group as a whole."

Maybe this, in the authors' minds, is simply a mode of indicating the strength of their own views as to how to use the trinomial versus the binomial form of scientific name for this sparrow; *they* propose the *trinomial.* But certainly I, as one reader, after double-checking all the authors' collateral statements, do see other reasons, and non-sentimental ones too, for continuing to call the Ipswich Sparrow, *Passerculus princeps.* In the first place, under the authors' treatment, the genus *Passerculus* contains but one species, *sandwichensis,* this therefore with upwards of 18 subspecies. What, then, practically, is the value of the middle term in all these trinomial names—*unless* we, even arbitrarily, adapt the function of the binomial for indicating recognizable "groups" of subspecies within the genus? This course I think is the justifiable one in the genus *Passerculus,* even if not in certain other fringillid genera of more or less similar make-up. Consistency of treatment is impossible. Nature has not acted with uniformity in the different genera —far from it.

Further along this line, I note that Peters and Griscom in discussion refer to the "Savannah Sparrows proper" or the "typical Savannah Sparrows (in the old or popular sense)" as set off from the "*rostratus* group." Why, then, run the subspecies of the latter "group" into the same binomial series? A usable and useful break comes between *anulus* and *halophilus,* as I have indicated in the revised list of the forms of *Passerculus* at the end of the present critique. (This was first suggested by Oberholser, Cleveland Mus. Nat. Hist., Sci. Publ., vol. 1, 1930, p. 111.) There seems to be a stampede among avian taxonomists toward running long series of forms that are more or less near related, into continuous series of trinomials. The test of demonstrated geographical blending no

longer suffices; now the criterion is intergradation through individual variation irrespective of spatial contiguity, this as exhibited in discrete, uncorrelated characters. That is to say, returning to *princeps,* even though constantly different in aggregate of characters from its geographically, and doubtless also its phylogenetically, nearest relatives, *labradorius* and *savanna,* the authors reduce it to subspecific status *because* as to size it is overlapped by the far-distant *sandwichensis* and as to certain features of coloration it is approximated by the distant *nevadensis* and in pallor "is exceeded by certain races of the *rostratus* group in Lower California." They say, "There is no *absolute* [italics theirs] difference of any kind between this form [*princeps*] and one or more races of *P. sandwichensis*"—another positive statement, the warrant for which does not stand up under close scrutiny. For, this extreme criterion for reduction to subspecies, of gross intergradation in discrete or separate characters, if applied similarly would, it looks to me, tumble into conspecific groups a long suite of warblers, of empidonax flycatchers, chickadees, nuthatches. Especially would this criterion, too much a matter of personal opinion anyway, be highly undesirable when we consider the current opposite trend, that of *generic* splitting whereby, already, many of the accepted genera contain but one species, with its series of included subspecies. Nomenclature must be kept subservient to practical needs and as far as possible free from perturbation through changeable personal hunch.

Like some other contemporaneous writers, Peters and Griscom are "superior" to using vernacular names formally in headings, associated with the scientific names—which would certainly have made their special applications of the latter more quickly apparent to the present reader. At the same time vernaculars are used here and there in the running text! Why not have furnished help in this way to that reader who does not happen to be wholly familiar with the literature of this particular group? Indeed, some of the vernacular names used by the authors incidentally in the text are obviously more permanent than the associated scientific ones!

Another feature of Peters and Griscom's paper that I think may properly be criticized (and recent systematic papers by other persons are censurable on the same score) is this: That essentially biological fact and discussion all through are confusedly mixed with fact and argument relative to the application of names. Speciation and nomenclature are two totally different realms of thought. Indeed, here and there it appears to me as though matters of naming antedated or dominated in the authors' minds the scientific considerations directly concerned with the race defined. For example, type locality has nothing to do with definition or range of a subspecies; it is purely a matter of accident and has to do only with the fixation of a name. Yet we find the word "typical" used, at least in some places, in connection with the concept of a race as a biological entity. So with "topotypes," such specimens being cited as exemplifying the highest development of the characters of a natural subspecies—which rarely either the type or topotypes do! Running back and forth through the paper, I see that "typical" many times is used really in *both* senses—certainly beclouding the discussion as a whole.

Here is a suggestion at large: Would that some thoroughly qualified student of avian speciation select a geographically variable group, like *Passerculus,* and publish a paper revising that group, in two parts: (1) the main part, exclusively biological, setting forth the facts of characterization and distribution of each race decided to be definable as such, under merely a graphic designation, such as *a, b, c,* etc., together with full discussion of centers of differentiation, trends of variation, ecology, and the like; and (2) a part, or appendix relegated to subsidiary place, dealing with the names to be applied under the rules of nomenclature—a sort of concordance of the letter-designations

with the names for the races then given, along with purely nomenclatural debate bringing in matters of type-ship, type locality, name-priority, etc. By this scheme, we would be afforded what is really needed, a revision of soundly zoological nature clear through, uncontaminated by nomenclatural artificialities, *followed* by whatever needs to be decided concerning the names. Won't someone *try* this, and see if an improved type of revision does not result?

There will, of course, be outright mistakes in any publication; a modicum of mistakes is normal. But in the paper now reviewed there are too many typographical errors, as if hastily proof-read. Other kinds of mistakes are also too often apparent. On page 460, line 22, "loc. cit." fails to lead back to any appertaining citation; specimens referred to on page 464, line 5 from bottom, and page 465, top line, are in M. V. Z., not "M. C. Z."; the "resident" range of *bryanti* (in the current application of this name) is declared (p. 473) to extend south to "Ventura County, California"; and at the same time individuals from "San Mateo" County, as well as Los Angeles County, are stated to be "obvious intermediates" between *bryanti* and *beldingi*. San Mateo County is, of course, on San Francisco Bay next door to San Francisco. However, there is the chance that these last two "mistakes" (supposed so to be by me on basis of my knowledge of materials at hand) are really matters of differing interpretation.

Here and elsewhere in the paper there is lack of clarity in certain vital concepts. Individual variants within the metropolis of a given race that happen by chance closely to resemble or even exactly to duplicate individuals from within the metropolis of another race, the authors seem inclined to call by the name of the latter race; at least in *some* places they do. My idea, and I am sure this is the idea of many another systematist, is that relationship to the population of which a bird is a member must be given foremost consideration, over any certain resemblance to members of another race. That is to say, probable blood relationship is often more important in making subspecific determinations of individual specimens than some feature of outward appearance, *when* place of occurrence militates accordingly.

General meaning in some other connections is not clear because, I think, the special meanings or applications of words or phrases have not been carefully weighed. Ambiguity results. For example, the word "distinct" in different places shows a sliding scale of meaning; so also "typical," as I have pointed out in another paragraph. The combination of "much" with descriptive words—"much paler," "much heavier," "much broader" —is often an actual exaggeration. "Very faintly" (p. 467), "very few," "very different," "very much darker" (pp. 472, 473), are not too happy; indeed the word "very" might with profit be expunged from our descriptive vocabulary!

Now some commendatory comment: The authors are sharply condemnatory of "opera glass" identifications of subspecies. I completely agree with them in this stricture. The subspecific identity of Savannah sparrows is well-nigh certain when an observer is on the breeding grounds of a race in the height of the nesting season, especially if authentically determined specimens from there be contained in a collection accessible for ready reference. But when it comes to trying to name subspecies of birds seen at migration times or in winter, it is, as a rule, folly to use subspecific names. Let the specific name then suffice! Seasonal bird lists published in reputable journals are full of such unwarrantable namings. Only where use of the gun has been resorted to should subspecific names be given, though I grant there are (rare) exceptions to this dictum.

Another thing I commend: Peters and Griscom in naming their two new races selected simple but appropriate Latin adjectives—*oblitus* and *crassus*—short, easy to spell and remember. They did *not* foist into nomenclature any long combination of classic

roots such as no Greek or Roman ever heard of, no barbarous geographic name, no personal name. Blessings on them—in *this* regard!

With both the biological and nomenclatural findings as regards eastern North America, except as to the status of *princeps*, the present reviewer can find no serious fault. Indeed, he is impressed with the propriety of the authors' conclusions, as consequent upon the evidence and discussion presented. But when it comes to the nomenclature of the Pacific Coast forms, objection arises in his mind, to the point of protestation. What WAS *bryanti* becomes *alaudinus;* what WAS *alaudinus* becomes *anthinus;* what WAS *anthinus* becomes *crassus!* If these shifts be generally adopted, think of the confusion thenceforth in the literature! The *concepts* of the subspecies concerned remain practically the same. Moreover, *are* these confusing transfers of names really justified under the rules of nomenclature? If, in final analysis, they are, then isn't it time to invoke suspension of the rules, in the interests of *ornithology*, in order to retain the long-used names?

The ground advanced by Peters and Griscom for their so-positive statement that the "local coastal race, better known as *bryanti* to American students, must [*sic!*] now be known as *alaudinus*," is that the "type" specimen of the latter turns out to be identifiable with the San Francisco Bay race, and the name *alaudinus* of Bonaparte has long priority over *bryanti* of Ridgway. The case for such change is really not at all so clear-cut: (1) Bonaparte's description by itself is brief and indefinite as applying to any one race of *Passerculus sandwichensis;* (2) the locality given is merely "Californie," although the indicated collector, P. A. Delattre, can be shown to have been in the vicinity of San Francisco or Monterey from August, 1851, until about the same month in 1852 (see Palmer, Condor, vol. 20, 1918, p. 123), but the exact places and dates of his collecting can now only be guessed at; (3) so early as 1853 there was no such thing as a type specimen in the modern sense—certainly Bonaparte did not indicate one in his description of either *alaudinus* or *anthinus;* (4) a "type," subsequently so marked, in the Paris Museum, is reported to be a mounted bird, worn and faded, furthermore "partially albinistic" (van Rossem, Trans. San Diego Soc. Nat. Hist., vol. 7, 1933, p. 346). This type specimen has been examined by just one person, as far as I know, who is competent to identify it subspecifically—van Rossem as above, who declares it to be an "example of the Bryant's Marsh Sparrow, normal [*sic*] in size and proportions and as regards the unaffected portions of the plumage."

Before he had seen this type, the same author made some comments which may be quoted as significant in the present connection (van Rossem, Trans. San Diego Soc. Nat. Hist., vol. 6, 1931, p. 297): "In the matter of Dr. Oberholser's treatment [Cleveland Mus. Nat. Hist., Sci. Publ., vol. 1, 1930, pp. 109-111] of the races of *Passerculus sandwichensis,* however, such name changing as is involved in the case of *nevadensis* seems to me to be wholly unwarranted. While Bonaparte's description of *alaudinus* is vague in the definition of essential characters, this very vagueness eliminates any necessity for a switching of names. . . . Under these circumstances I cannot see any advantage in adopting the proposed transfer of a long-established name [in this case, *alaudinus* to apply to *nevadensis,* as proposed by Oberholser] with the consequent confusion of literature. Neither can I subscribe to the 'lumping' of the Savannah sparrows of the northwest coast and of the interior [as also had been proposed by Oberholser]. If the coastal race (*anthinus*) is to be merged with any other it must be with *savanna,* but certainly not with *alaudinus,* using the latter name in the sense employed by Swarth and authors in general." Pretty much these same, one-time sentiments of van Rossem

hold with me as regards Peters and Griscom's ruling to supplant the name *bryanti* with that of *alaudinus,* with its train of consequences.

A point in Bonaparte's descriptions (Comptes Rendus, vol. 37, 1853, pp. 918, 920) that seems not to have been given weight by any of the recent proponents of name shifting is this: Bonaparte describes his *Passerculus alaudinus* first, comparing it with *P. savanna,* and then follows immediately with *Passerculus anthinus,* which he declares to be still smaller than *alaudinus,* with a more slender bill, and more heavily marked below. How that comparison can be reconciled on the basis of Bonaparte's *alaudinus* having been a specimen of *bryanti,* I cannot see! Indeed, long before Ridgway named *bryanti,* the existence of a small dark bird in the San Francisco Bay region evidently had been known to Baird and Cooper, and for it they used the name *Passerculus anthinus,* probably taking Bonaparte's description at face-value and disregarding the locality "Kadiak." Yet another nomenclatural course might thus be suggested—with much vigor! (For this and other angles, see Ridgway, Proc. U. S. Nat. Mus., vol. 7, 1884, p. 517, footnote; Grinnell, Condor, vol. 3, 1901, p. 85.)

And some further considerations bear on the question of typeship: The range of the resident race *bryanti* in the San Francisco Bay region is notably limited—to the salt marshes; additionally, there is an upland, bald-hill, summer-resident form, not yet named though possibly not satisfactorily definable (see Mailliard and Mailliard, Condor, vol. 22, 1920, p. 63); there are possibly five winter-visitant races, *brooksi, nevadensis, sandwichensis, anthinus,* and *alaudinus,* using these names in their current application, not in that of Peters and Griscom; of these, *alaudinus* is the most abundant and widespread locally, and it arrives as early as the first week of September and some individuals may tarry until the last week of April; in aggregate numbers *alaudinus* probably exceeds the combined populations of all the other races, both resident and winter-visitant; variation is very great; through the years, I have spent much time on the large series in the Museum of Vertebrate Zoology, trying to discharge the curatorial "duty" to put *some* name on each and every specimen; the simple fact is that many specimens are so equivocal in characters as to defy naming except by fiat (this I have *done,* admittedly, but have no defense to offer except that of meeting the need for *some* designation to use in our system of cataloguing!); van Rossem's measurements of the supposed type of *alaudinus* are not one of them exclusive for the race *bryanti;* axiomatic is the statement that the larger the amount of material of a related group of subspecies available the more extensive the range of variation manifest, and the more individuals of uncertain appearance turn up. What, then, of the genetic significance of any single Savannah sparrow from the San Francisco Bay region? *Can* it be positively identified as of one race or another, *except* upon clear manifestation of all or of at least the most diagnostic of the characters of one of the races? What of the allocation of a *supposed* type specimen which is stated to be abnormal in some respects, even though "normal" (for *bryanti*) in others? In the face of this concert of doubts, "must" a change of names be made?

Then as to the proposal of supplanting the name *alaudinus* with *anthinus,* made so vigorously by Peters and Griscom, much the same considerations as I have offered above may be urged against this change, irrespective of the item of page-priority of the former name. Bonaparte's description of *anthinus* is likewise too indeterminate for definite application to one subspecies, at least two of which must occur at times on Kodiak Island, the locality whence *anthinus* was ostensibly named. No "type" specimen whatsoever is known. I do not feel it necessary to accept the dictum of Peters and Griscom (p. 465) "that as the type-locality [*sic*] of *anthinus* is Kodiak Island, the

characters of the subspecies *anthinus* will be those displayed by a definitely breeding [*sic*] series of Kodiak Island birds." The basis of the original description *might* have been a migrant of *alaudinus* (in the current application).

Incidentally, I have just closely re-examined the basis (type, no. 3476, Stanford Univ. Mus.) of the name *xanthophrys* Grinnell (Condor, vol. 3, January, 1901, p. 21). This specimen was collected at St. Paul, Kodiak Island, July 18, 1897, and is undoubtedly representative of the breeding population, as are two other specimens at hand. I may say that when I bestowed this "new" name, I was blissfully unaware of Bonaparte's *anthinus;* Ridgway's Part I, giving synonymies, was not yet out. Even so, *xanthophrys* is an identifiable name applying definitely to the Savannah Sparrow breeding on Kodiak Island. But here is a vital point: The three Kodiak birds at hand are unequivocally similar in every respect to birds from the Sitkan district of southeastern Alaska. This fact was brought out with his customary clarity by Swarth (Pac. Coast Avif. No. 22, 1934, pp. 48ff). And yet this exposition by a systematist experienced first-hand with Alaskan biogeography, and with adequate pertinent material before him, was discounted at this vital point by Peters and Griscom!

If, as seems from the above arguments, *Passerculus anthinus* Bonaparte is not subspecifically identifiable with certainty, I suggest choice of two nomenclatural courses: (1) For the A. O. U. Committee to rule the name *anthinus* as out of consideration, to be regarded thenceforth as a "nomen expurgandum." Thereby the race of southeastern Alaska would become known as *P. s. xanthophrys* Grinnell, and the name *crassus* of Peters and Griscom would fall as a synonym. (2) For the A. O. U. Committee to declare the name *anthinus* usable in the application set forth by Swarth, thus to heed prevalent custom and thereby avoid synonymic confusion. Then both *xanthophrys* and *crassus* would have to ride as synonyms under *anthinus,* and the latter, the best known name for the Sitkan race, would continue in use. I, personally, choose the second course.

Peters and Griscom dwell (pp. 466–467) at length and informatively upon the perplexing kinds and amounts of variation in the Savannah Sparrows they encompass with the name *anthinus.* I merely add my concurrence, save in one point of proffered explanation, wherein they say they "are forced to believe that there is a certain amount of dichromatism." If this should in truth obtain, then the value of the main color character (richer, reddish brown) of their *crassus* is discounted. But I myself cannot see any basis for recognizing a condition of dichromatism in *Passerculus;* I can see wide range of color tone in breeding series from given localities, but nothing bi-modal in nature.

Might I at this point indulge in an animadversion? There seems to me to have been a certain nomenclatural exuberance on the part of several of the contemporary systematists cited in this critique—a sort of over-enthusiasm to seize an opportunity to change a bird's name. I will confess that I myself have experienced the thrill, doubtless also theirs, upon finding a current name (dating from another author!) apparently preoccupied. I now look back upon certain of my own writings with more or less amused regret. Someone said with a great measure of truth over one hundred years ago: "Opinions are always to be distrusted which are formed during the ardour of novel investigations." *Time,* for calm, impersonal reflection, is required for bringing final, correct appraisal.

Now if, in the mind of my reader, who will also have read searchingly everything in the Peters and Griscom paper to see that I have done those authors no polemic injustice, I have not succeeded in establishing some of the dubiety that exists in my own mind concerning the wisdom of making those proposed name-shifts, then I make

recourse to another suggestion, already hinted at. This is to appeal to the principle of "nomina conservanda," for application to specific and subspecific names, as it is already in force under the activities of the International Commission on Zoological Nomenclature for preserving certain chosen generic names. Under these rulings, each case being carefully considered, the regular Rules of Nomenclature are set aside, and the preferred names are placed on an "Official List," then permanently beyond reach of name-shifters. Was it not to secure permanence and stability that the whole system of nomenclatural rules was set up in the first place? Sometimes it looks as though only *in*stability had been achieved!

I therefore here and now propose that the A. O. U. Committee on Nomenclature put upon its agendum for early serious consideration, and *action* (at least as far as positive recommendation to the International Commission), this matter of *preserving* designated well-known subspecific and specific names of North American birds against replacement on any grounds whatsoever. Such action might be made conditional upon the extent of the use, in ornithological literature, say to the extent of more than 50 percent of all citations, of any one name over against a challenging name. Some cases now gone by might well be given ex post facto attention.

It is commonplace to urge that the naming of animal kinds, on the basis of any sort of rules, is merely to help in obtaining and filing knowledge of those kinds. Many people have thought that our present so-cumbersome system of scientific names might well give way to some simpler method of designation, by symbols or formulae, and maybe it will; but no one yet has invented any acceptably workable method, one that will not only provide permanent designations but that will indicate phylogenetic relationships. The present system will survive to subserve its best use throughout the vast breadth of modern ornithology, and will endure, just to the extent that these functions of nomenclature are carried out. It is high time that permanence of names, in fact, is attained.

Let it not be inferred that I belittle the position of systematy (apart from nomenclature) as a most worthy field of ornithological research. That portion of Peters and Griscom's paper which sets forth their findings with regard to geographic, age, seasonal and sexual variations, to determination of truly racial characters, to the correlations of these with environments, in other words, to the evolutionary results at the present time level in the group of birds studied—all this is real contribution to science. Nor do I at all inveigh against further refinements in subspecific splitting, just so thorough descriptions are given of the forms newly defined, adequately justifying their recognition. Indeed, I think these authors were decidedly conservative in having named only two supposedly new forms in a group that is so variable and that had not before been revised as a whole. As they themselves say, additional geographically representative material will warrant another revision and will likely lead to the formal recognition of yet other racial populations.

No, it is not the ornithological content of the Peters and Griscom paper that I would criticise adversely in any serious degree, but the nomenclatural content which unfortunately is so mixed in with the other as to form a barrier to the reader's understanding. On this score my main protest is *against the shifting of names* whereby our present literature concerning the natural history of the forms affected would become everlastingly confused. This can be avoided by the simple expedient, on the part of the established American authority in questions of nomenclature, namely the A. O. U. Committee, of fixing those long-used names in the status of nomina conservanda. And eventually the practice should become world-wide.

With all the above reflections induced by Peters and Griscom's paper, along with the extensive factual data they give, and after a re-examination of the collection of Savannah Sparrows in the Museum of Vertebrate Zoology, I venture to offer the following list of names as the ones in my present judgment best to use. Vernaculars are chosen mainly with regard to precedent. The sequence also is chosen with thought.

Passerculus princeps Maynard. Ipswich Sparrow.
Passerculus sandwichensis labradorius Howe. Labrador Savannah Sparrow.
Passerculus sandwichensis savanna Wilson. Eastern Savannah Sparrow.
Passerculus sandwichensis oblitus Peters and Griscom. Canadian Savannah Sparrow.
Passerculus sandwichensis alaudinus Bonaparte. Western Savannah Sparrow.
Passerculus sandwichensis nevadensis Grinnell. Nevada Savannah Sparrow.
Passerculus sandwichensis brooksi Bishop. Dwarf Savannah Sparrow.
Passerculus sandwichensis brunnescens Butler. Mexican Savannah Sparrow.
Passerculus sandwichensis sandwichensis Gmelin. Aleutian Savannah Sparrow.
Passerculus sandwichensis anthinus Bonaparte. Kodiak Savannah Sparrow.
Passerculus sandwichensis bryanti Ridgway. Bryant Savannah Sparrow.
Passerculus sandwichensis beldingi Ridgway. Belding Savannah Sparrow.
Passerculus sandwichensis anulus Huey. Scammon Lagoon Savannah Sparrow.
Passerculus rostratus sanctorum Ridgway. San Benito Island Large-billed Sparrow.
Passerculus rostratus halophilus McGregor. Abreojos Large-billed Sparrow.
[*Passerculus rostratus guttatus* Lawrence. San Lucas Large-billed Sparrow. (Status uncertain.)]
Passerculus rostratus rostratus Cassin. San Diego Large-billed Sparrow.
Passerculus rostratus atratus van Rossem. Sonora Large-billed Sparrow.

Museum of Vertebrate Zoology, University of California, Berkeley, March 17, 1939.

FROM FIELD AND STUDY

Feeding of Gulls on Pismo Clams.—Low tide at Sunset Beach, Santa Cruz County, California, on February 16, 1939, brought men of several races and gulls of several species together with the common purpose of preying on the Pismo clam. Man took the "legal" clams, over five inches in length, while the gulls took the smaller, rejected ones.

The gulls would follow right after the men digging clams, and pick up the smaller ones discarded as below the legal limit. Clams near five inches were apparently too large for the gulls to carry, but those four inches or smaller were seized in the bill and carried away. The birds would then mount thirty to fifty feet in the air over the hard, water-packed sand and let the clam drop. Often two or three tries were necessary, but finally the two halves would fall apart or the shell would break. Then amid much fighting and thieving the feast would begin, with Sanderlings waiting nearby to pick up any scraps that might fall to them. Attempts by the writer to open clams by methods similar to the gulls' resulted in failure, leading to the belief that there is yet something to be found out about the gulls' method of opening the shellfish.

The above observation has been checked since, at times when the tide was low and clams were dug, and the same procedure was followed by the various species of gulls.—ALBERT C. HAWBECKER, *Watsonville, California, March 21, 1939.*

A Motive for Killing a White-tailed Kite.—On February 17, 1937, a friend brought me a male White-tailed Kite (*Elanus leucurus*) which he said had been killed that day by the keeper of a gun club near Vallejo, California. I visited the club a few days later and informed the keeper of the penalty for killing this protected species, advising him also of its beneficial habits and of the fact that these birds had never been known to do anything which might be considered as harmful.

He disagreed with me in my last statement. He said that he knew of three birds of this species on his property and that he had for some time been endeavoring to "get" this particular bird. At night it roosted under the eaves of the club house, splattering the sidewall on one side of the building with excrement. The roosting location was the top rung of a ladder leaning against the north side of the building and reaching to a point just under the eaves. The location apparently offered the bird a satisfactory roosting place, there being no trees on the club grounds or within a mile.

This is the only instance coming to my attention where a kite has been relegated to the English Sparrow class of building splatterers. Personally I would be delighted to have such a close acquaintance with this amiable species and would not mind the splattering.—EMERSON A. STONER, *Benicia, California, March 17, 1939.*

Winter Robins and Waxwings in Montana and Western North Dakota.—During the winter of 1936–37, the failure of other employment led me to undertake the use of my natural interest in plants by the collection of native material for planting purposes. The largest single item was seed of the western red cedar (*Juniperus scopulorum*), which is abundant in some parts of the Badlands of western North Dakota. The year 1937 produced quite an abundant crop of berries. About the first of December, the Robins (*Turdus migratorius*) began to congregate in the cedars, where they remained until about March 1, feeding upon the berries. Magpies also ate the berries. Snowfall was unusually heavy that winter and collecting was a laborious, not to say hazardous, occupation.

The year 1938 produced very little fruit on the cedars, perhaps due in part to the fact that they require two years to mature. Hearing that the crop was good in the mountains, I moved to a locality in the region of Butte, Montana, where collecting was good until competition with the Bohemian Waxwings (*Bombycilla garrula*) developed. About the first of January, I estimated that 1000 pounds of berries remained on the trees where I was working. In less than a week's time there was scarcely a berry left. Inspection of other areas in the vicinity showed similar conditions. The fruits of snowberry (*Symphoricarpos racemosus*) had also been eaten and those of wild roses made up a considerable part of the birds' food.

It is interesting to watch the waxwings pillage a tree. The birds are usually so numerous that the tree is covered so thickly that it is difficult to see the foliage. Even though there is an adjacent tree covered with berries, they all stick to the same tree until it is stripped. They usually leave the tree simultaneously, their hundreds of wings making a loud sound, not unlike that of a landslide.

The loss of the berries was a considerable item to me, but I realize that I was disturbing the balance of nature, or rather, trying to effect a wider distribution of the seeds. The birds digest only

the pulp and scatter the seeds, which then germinate more readily. If one could only reclaim the seeds after the birds have cleaned them, it would be a real coöperative enterprise!—E. C. MORAN, *Medora, North Dakota, March 13, 1939.* [Transmitted by Prof. *O. A. Stevens.*]

New Bird Records for Nevada.—The following observations made along the shore of Lake Mead near the site of St. Thomas, Clark County, Nevada, provide new records for the State of Nevada.

Squatarola squatarola. Black-bellied Plover. On May 6, 1938, ten of these birds were observed along the lake shore. The following day no trace of them could be found. Apparently they had stopped only briefly on their flight northward.

Hydranassa tricolor ruficollis. Louisiana Heron. Observed along the lake shore on November 21, 1938. A careful search of the vicinity revealed only the one individual.—RUSSELL K. GRATER, *Boulder Dam Recreational Area, Nevada, December 10, 1938.*

Eastern Brown Thrasher Banded in Hollywood Hills, California.—On January 13, 1939, I trapped and banded a Brown Thrasher (*Toxostoma rufum*). The bird was subsequently observed daily up to February 28, 1939. It appeared to be here alone. This bird was also seen by Mr. Josiah Keely and Mrs. Mary Barnes Salmon, both of whom are familiar with this species in the East. [The bird is still present on April 17.]

Mr. George Willett advised me that the Brown Thrasher has only been observed once before in southern California when it was seen in Pasadena from December 1, 1932, to March 12, 1933.—C. V. DUFF, *Hollywood, California, March 6, 1939.*

Guadalupe Island Xantus Murrelet in California Waters.—After reading the interesting article by J. Elton Green and Lee W. Arnold, in the Condor for January, 1939, the writer studied, in comparison with their findings, the specimens of *Endomychura hypoleuca* in the Los Angeles Museum. The series now in this institution (collections L. A. Museum, L. B. Bishop, J. S. Garth, and G. Willett) numbers 31 birds, two from Guadalupe Island, fourteen from Los Coronados, the remainder from Californian waters.

The results of this study appear to substantiate the conclusion of Green and Arnold that there are two races of *hypoleuca*, one of which has been found nesting only at Guadalupe Island. Our two examples from the latter locality are like the ones figured by Green and Arnold. There are, also, two specimens (nos. 2803, 2804 coll. G. W.), undoubtedly migrants, taken by the writer in the channel between San Pedro and Catalina Island, August 11 and 13, 1928, that appear referable to the Guadalupe Island form, *E. h. hypoleuca*. That this bird should occur as a migrant along our coast is not strange, when the rather common occurrence of the related species, *E. craveri*, is considered.

That the relationship of the Guadalupe Island bird is closer to the breeding bird of California than it is to *craveri*, is substantiated by a study of our specimens. The black area beneath the eye is quite variable in width, and in some of our birds from Los Coronados Islands and Anacapa Island it is much narrower than in the figured type of *scrippsi*.—G. WILLETT, *Los Angeles Museum, Los Angeles, California, January 30, 1939.*

White-throated Sparrow Coincidence and Other Notes.—At my home in Eureka, Humboldt County, California, on November 29, 1934, I took a male White-throated Sparrow (*Zonotrichia albicollis*) from a flock of Golden-crowned Sparrows. I shot this bird from my pantry window at a distance of 22 feet. On March 13, 1938, I took a male White-throated Sparrow from a flock of Golden-crowned Sparrows, also shot from my pantry window at a distance of exactly 22 feet and in almost exactly the same spot, under a mock orange bush.

June 21, 1938, I took a male specimen of the Blue-winged Teal (*Querquedula discors*) from a fresh-water slough two and one-half miles north of Arcata, Humboldt County. This was at 10:30 a.m.; the female taking wing made a circle, doubling back, just out of gun range, then turned due west, fading from sight in the distant perspective. At six p.m., I went back and the female was in the slough, near where I took the male. After a half-mile circle on the old county road, I approached to a high bank shooting position; but the female was gone. It seems very unusual to find this species here in the month of June.

On August 21, 1938, I took a specimen of Surf Bird (*Aphriza virgata*), male, from a group of three at roaring surf's edge, open ocean, at the base of high cliffs on the south edge of Trinidad Head, Humboldt County.—C. I. CLAY, *Eureka, California, February 14, 1939.*

Winter Bird Notes from Roosevelt Lake, Arizona.—Roosevelt Lake, at an average altitude of about 2000 feet, is at the junction of Salt River and Tonto Creek, at the western edge of

Gila County, Arizona. The surrounding country is all within the Lower Sonoran Zone, is hilly and brush-covered. The lake is favored by ducks as a resting place during migration; but because of a constantly fluctuating shore line few species of water birds are found there in numbers during the winter. The lake constitutes a Federal Bird Refuge.

From January 24 to 31, 1939, I observed birds at this lake and was surprised to see so few, both of species and individuals. No specimens were taken, but observations were made mostly under conditions favorable for accurate identification. Ducks were negligible, there being only a few hundreds. Lesser Scaups (*Nyroca affinis*) were most abundant, with Canvas-backs (*Nyroca valisineria*) second. There were a few Mallards (*Anas platyrhynchos*), Green-winged Teals (*Nettion carolinense*), and Shovellers (*Spatula clypeata*). Wintering geese were abundant, however, although there are few published records of geese from Arizona. I saw several large flocks and heard others. On one occasion I was able to approach within less than 75 yards of a flock of 49 Canada Geese (*Branta canadensis canadensis*) that were grazing on young blades of Bermuda grass on a slope more than one-half mile from the lake shore. At such close range the large size of the geese was apparent. That the geese range even farther away from the lake is attested by a reliable report that six were seen grazing on the mesa more than two miles from water.

About December 23, 1938, a Canada goose, reported to weigh nearly 10 pounds, was shot at the eastern end of the lake. Local residents estimate there are at least 500 of these large geese wintering at the lake. They also said that in 1938 the geese did not come to the lake before November. Only one other species of goose has been identified, *Chen hyperborea*, as determined from the statement that a white goose weighing seven pounds was shot some time in November, 1938, from a flock of three. The wings of this goose have been acquired for the avian osteology collection of the Museum of Northern Arizona. Two other white geese are reported to have been seen several times during January feeding with a large flock of Canada Geese on the Tonto Creek end of the lake.

No shore birds were observed, but pelicans, cormorants, herons, coots, and gulls were common. White Pelicans (*Pelecanus erythrorhynchos*) for years have been regular winter visitors at this lake, one or more hundreds being found at the mouth of Tonto Creek. From 1919 to 1924 inclusive, I observed them in this abundance and I found this year to be no exception. Cormorants (*Phalacrocorax auritus*) appeared to be less numerous than formerly, but they could be seen at most any time resting upon snags in Salt River below the dam. They were not infrequently seen flying over or resting upon the lake.

Blue Herons (*Ardea herodias*) were abundant, there being single birds scattered along the shore every few hundred yards. Although not seen by me, Mr. James J. Lane reports that from about the end of October to early January he occasionally saw a white heron about the same size as the blue herons (probably *Casmerodius albus egretta*). He estimated 3 or 4 to be on the lake. Coots (*Fulica americana*) were seen at any time, but the total number probably would not exceed seven hundred, a relatively small number for the estimated 12 square miles of water.

Gulls were seen frequently, and in this respect were common although there were relatively few individuals. Generally a single bird could be seen on the lake, but I did not count more than twelve within sight at one time. I do not recall them being more numerous in years past than at present. Local residents report three different sizes, but all I saw appeared to be the Ring-billed Gull (*Larus delawarensis*). I know of no specimens having been taken in this locality.

Land birds that frequently are found about water numbered but two. One adult Bald Eagle (*Haliaëtus leucocephalus*) was seen circling over the lake on January 25. Although not strictly from the lake, a record of the Dipper (*Cinclus mexicanus*) should properly be recorded at this time. I did not record dates, but about 20 years ago I saw this bird in the cold rushing water below the dam. The temperature of the water at that place generally is between 50 and 55 degrees F.; the river resembles a mountain stream. I have not seen the Dipper immediately below Roosevelt Dam within recent days but the bird does occur under similar conditions below Horse Mesa power house at Apache Lake, 13 miles by river below Roosevelt Dam, according to Mr. F. K. Lane. He described the appearance and actions of this bird so accurately that there seems to be no doubt of the identification. Mr. Lane reports that three or four have been there for several weeks. This species has been reported from few localities in Arizona and never before, to my knowledge, from localities strictly within the Lower Sonoran Zone.

Strictly land birds were of normal occurrence according to the season and zone and need not be mentioned but for the fact that every species noted, with the exception of the Red-tailed Hawk (*Buteo borealis*), Goshawk (*Accipiter atricapillus*), Raven (*Corvus corax*), Canyon Wren (*Catherpes mexicanus*), Rock Wren (*Salpinctes obsoletus*), Phainopepla (*Phainopepla nitens*), and Shrike (*Lanius ludovicanus*), was observed daily to feed upon the exposed seed-pulp of fully ripened pomegranates still hanging upon the bush. These birds are the Gila Woodpecker (*Centurus uro-*

pygialis), Verdin (*Auriparus flaviceps*), Mockingbird (*Mimus polyglottos*), Palmer Thrasher (*Toxostoma curvirostre*), Crissal Thrasher (*Toxostoma dorsale*), Robin (*Turdus migratorius*), English Sparrow (*Passer domesticus*), Cardinal (*Richmondena cardinalis*), House Finch (*Carpodacus mexicanus*), Junco (*Junco oreganus*), and Gambel Sparrow (*Zonotrichia leucophrys gambeli*).—LYNDON L. HARGRAVE, *Arizona Game Department, Phoenix, Arizona, January 31, 1939.*

Eastern Hermit Thrush in Colorado.—An Eastern Hermit Thrush (*Hylocichla guttata faxoni*), a race hitherto unrecorded from Colorado, was found dead in west Denver, by H. M. Baldry, on February 8, 1939. The specimen (no. 19869, Colo. Mus. Nat. Hist.) was an adult female. Such a winter occurrence would have been unusual for even our common thrushes, as they rarely appear in our area before the last week in April.—ALFRED M. BAILEY and ROBERT J. NIEDRACH, *The Colorado Museum of Natural History, Denver, Colorado, February 24, 1939.*

Another Record of the Bohemian Waxwing at Grand Canyon, Arizona.—On Sunday, February 20, a dozen Bohemian Waxwings (*Bombycilla garrula*) were discovered feeding upon juniper berries on the north side of El Tovar Hotel on the south rim of Grand Canyon, Arizona. Their size quickly led to further discernment of distinguishing marks from the Cedar Waxwing, of pale color, lack of yellowish on underparts, white wing bars, cinnamon under tail coverts and weak lower-pitched call note. Reaching for a juniper berry a bird would roll it in its bill and flick the core away. Beneath the tree the soft snow was pitted with the dropped cores. Once a few of the birds dropped to a space on the ground, bare of snow, seemingly for gravel.

A small group of Bohemian Waxwings was observed by H. S. and W. W. Swarth (Condor, vol. 22, 1920, p. 79) in almost the same location on December 18, 1919, the only other recorded occurrence for Grand Canyon.—HAROLD C. BRYANT, *Grand Canyon, Arizona, February 24, 1939.*

Black Phoebe in British Columbia.—Shortly prior to his death, the late R. A. Cumming wrote to Mr. J. A. Munro, of Okanagan Landing, B.C., requesting that he prepare and publish a note recording the first capture of the Black Phoebe in British Columbia. As the Cumming collection, including this specimen, has been incorporated in the Provincial Museum collection, Mr. Munro has forwarded the letter to me with the request that I put the specimen on record.

The specimen in question is a well-made skin of a female *Sayornis nigricans nigricans*. This bird, to quote from Mr. Cumming's letter was "taken November 11, 1936, on the B. C. Electric Railway tracks near Marpole. The afternoon was cold, after a rainstorm. My son Gordon was with me at the time."

Had it been in the summer or early fall this occurrence could have been more readily understood. However, it is interesting, perhaps significant, to note that the other recorded occurrences of vagrant flycatchers in British Columbia were also in the fall and winter. Thus the only known specimen of *Tyrannus dominicensis* from the Province was taken at Cape Beale, V. I., on October 9, 1889, and the single specimen of *Tyrannus melancholicus chloronotus* was shot in February, 1923, at French's Beach, V. I.—IAN MCTAGGART COWAN, *Provincial Museum, Victoria, B. C., February 20, 1939.*

Adult Lamprey Eaten by a Great Blue Heron.—In the course of field work for the California Division of Fish and Game, on the South Fork of the Eel River, a quarter mile below Benbow Dam, Humboldt County, California, on November 17, 1938, occurred the incident here described. It concerned a great blue heron (*Ardea herodias hyperonca*) and a lamprey eel (*Entosphenus tridentatus*).

At 2:28 p.m., while I was watching from cover the opposite shore of a crescentic pool at a bend in the river, a Great Blue Heron walked into view about a hundred yards away. It slowly and deliberately waded upstream in the shallow, marginal water, then walked out onto the rocky shore at the edge of the pool, all the while peering for food. Presently, the bird waded deeper into the pool. After poising its head for an instant just out of water, it struck quickly at something below the surface. Straightening up, the heron waded to shore with an adult lamprey held firmly by the head in its beak.

At a point about five feet from shore the heron dropped the twisting lamprey onto the gravel. Each time the lamprey wriggled and contorted its body the heron struck at the head with its dagger-like beak. At 2:34 p.m., the lamprey wriggled once more, whereupon the heron, after poising its head momentarily about two feet above the lamprey, drove its beak hard into the gill region and quickly withdrew it, watching, then, for further movement. Once again the lamprey moved and again it received a severe thrust from the beak of the heron. After another moment of watching the

heron carried the lamprey to the edge of the pool where it was immersed. Then, taking the lamprey in its beak, the bird attempted to swallow the animal head first; but the cylindrical prey slipped easily from the mouth of the heron.

At 2:35 p.m., the heron began to work with the dead lamprey in the shallow water and tried to tear loose small pieces of its body. Once, while giving the lamprey a vigorous shake, the heron was momentarily cast off balance but quickly regained footing with a side-step. At 2:38 p.m., the bird again tried to swallow its prey entire, but let go after a bad start. Four minutes later the heron again tried to swallow the whole lamprey. The neck of the bird was distended when the lamprey moved down its throat as the bird tried vigorously to gulp down its victim, though without success.

After a short rest the heron shook the lamprey again in the water. Finally, at 2:47 p.m., the heron took the lamprey once more by the head; and, following a series of progressively violent, undulatory jerks of the head and body, the bird, as it was able to straighten its long neck in the process of swallowing, succeeded in engulfing, inch by inch, the whole lamprey. The bird presented a ludicrous sight as it stood between jerks of the head and body with the lamprey drooping from its beak. More amusing still was the appearance of the bird as it stood humped, heron fashion, near the shore of the pool and occasionally writhed and straightened its neck in trying to ease the bulging crop. When the heron saw me move from cover it quickly flew upstream out of sight beyond the dam.—ELDEN H. VESTAL, *California Division of Fish and Game, Stanford University, California. February 28, 1939.*

More Shore-birds from the Humboldt Bay Region.—Mountain Plover. *Eupoda montana.* Male taken on January 8, 1927, on the ocean side of Humboldt Bay. On December 6, 1938, a female was taken by Robert Talmadge near the same place.

American Golden Plover. *Pluvialis dominica dominica.* Male taken August 31, 1935, near the mouth of Clark's Slough, within Eureka city limits. The capture of this species makes 31 kinds of shore-birds I have taken in the near vicinity of Humboldt Bay.

Baird Sandpiper. *Pisobia bairdii.* August 15, 1926, seven birds seen, three specimens taken. August 22, three birds, one taken. September 18, eight birds, three taken. In 1927, I did not find a single Baird Sandpiper. On August 19, 1928, one was found and taken, as it was following a small flock of Sanderlings at the water's edge. In 1929, on August 11, four birds, one taken; September 1, five seen, two taken; and September 8, ten seen, four taken. In 1930, none; in 1931, September 3, three seen, one taken; in 1932, August 20, eleven seen, four taken; in 1933, August 21, two seen, one taken. On August 23, 1936, Miss Leno Moll found three Bairds, one sample taken. The above Baird Sandpipers were all found on the ocean side of Humboldt Bay.

Avocet. *Recurvirostra americana.* Male taken on August 17, 1935; a female taken August 18. They were found in a small pond of stagnant water within Eureka city limits.—JOHN M. DAVIS, *Eureka, California, February 5, 1939.*

Notes from the Palo Alto Sports Club.—The Palo Alto Sports Club lies in Santa Clara County, California, between the Bay Shore Highway and the south end of San Francisco Bay. Here, some twenty years ago, two large pools were diked off by a now quiescent salt company. Water gates were put in to control water levels. The dikes were graded and thus make it possible to drive around the two pools, covering a distance of several miles, and to reach the South Bay Port Warehouse on the east. Obviously, it is a paradise for the observation of shore and marsh birds. The Club has graciously given keys and honorary membership, of course without hunting and fishing rights, to Dr. Willis H. Rich and the writer, with permission to bring in qualified students and visitors. As a result, during the last two years, this area has been checked, at times almost daily, by us and the following students interested in the Stanford Natural History Museum: Applegarth, Cope, Henry, King, Longhurst, Nichols and Sanders. The following citations from notebooks seem worthy of record because of their bearing upon seasonal and geographical distribution.

Northern Phalarope. *Lobipes lobatus.* First observed on April 22, 1937, when a lone bird was rescued by Sanders with no little labor and some danger from a deep viscous mud-bank. Subsequently, they were present in hundreds throughout May. They returned in equal numbers in late July and August. In 1938, the water level was lowered and only one Northern was noted, July 17. 1937 was a great phalarope year for this area; 1938 was almost a total blank. The same holds for Bonaparte Gulls (*Larus philadelphia*) and Caspian Terns (*Sterna caspia*).

Wilson Phalarope. *Steganopus tricolor.* First observed on July 28, 1937. They remained in small groups consorting with the Northerns until late in August. Early birds were mostly in molt; of seven taken by the writer, five were females. The males were doubtless still largely detained elsewhere

by their family cares. None noted in 1938, and, to judge from the past, they will probably not appear again for years.

American Avocet. *Recurvirostra americana*. Abundant in 1937 at both pools; 63 were counted on July 12. Young appeared in June in broods of one, two and three (sheer exactness is difficult because of their skulking and hiding in grass and weeds). One brood of four was definitely noted. On June 10, two young birds were observed swimming blithely a hundred feet or more from shore, causing more than usual trepidation to their excited parents. During the summer this breeding colony was a constant source of delight to many visitors. In fact the writer, for several weeks, functioned largely as a kind of exalted Avocet patron, to show them to their eager friends and as a self-deputized warden to protect them from those of evil intent. The lower water levels of 1938 apparently changed the scene. No young were noted, and in mid-July not more than seven could be counted along both pools.

Sanderling. *Crocethia alba*. On the south shore of the east pool, 23 were observed on September 11, 1937, and seven at the same place on September 25. The shores are muddy and the birds were not happy with the association (see Junea W. Kelly, "Geologic Factors in the Distribution of Birds," Condor, vol. 37, 1935, p. 11). They remained scattered, singly or in very small groups; no flocking and, of course, no platoon running with the waves. Their curious petulance toward the omnipresent Western Sandpipers (*Ereunetes mauri*) was striking.

Lesser Yellow-legs. *Totanus flavipes*. On March 5, 1937, two were observed on the Dudfield Flat, on the west side of the Bay Shore. One was taken (no. 182, E. W. M., collection Stanford N. H. Mus.). This is unique, the writer believes, as a spring migrant for the San Francisco Bay region. In fact (so far as the writer knows) most of the California records are for late summer or fall birds.

Western Snowy Plover. *Charadrius nivosus nivosus*. Young fledgling birds were observed on the middle dike, on August 3, 1937. None noted in 1938. Semipalmated Plovers (*Charadrius semipalmatus*) also were much more numerous in 1937 than in 1938.

Spotted Sandpiper. *Actitis macularia*. Only one has been observed in the area, September 11, 1937 (no. 551, E. W. M. Coll.).

Baird Sandpiper. *Pisobia bairdii*. A solitary bird was taken on the south shore of the east pool on September 4, 1937 (no. 540, E. W. M. Coll.). Identification has been kindly confirmed by Mr. Chase Littlejohn, and by Robert T. Orr of the California Academy of Sciences. The Baird is so rare in this area that it was not even listed in the 1927 "Directory" to the bird-life of the Bay region by Grinnell and Wythe.

Western Pigeon Hawk. *Falco columbarius bendirei*. One was taken by Longhurst near the west pool, on November 7, 1937 (no. 623, E. W. M. Coll.). Mentioned only because this bird had very recently dined on two Least Sandpipers (*Pisobia minutilla*), as proved by the feet found in the stomach. Another taken, also by Longhurst, at Pescadero, San Mateo County (no. 678, E. W. M. Coll.), on January 18, 1938, by the same token had a penchant for Savannah Sparrows (*Passerculus sandwichensis* subsp.), save that in this instance the feet were not swallowed.

White-tailed Kite. *Elanus leucurus*. Only one noted as it hovered over a grain field, south of the lower Embarcadero, on June 2, 1937. Mentioned here only because in this identical area this lovely and lovable bird is recorded as common by several observers at the turn of the century.

Desiderata: We have about given up hopes of noting either of the Turnstones, the Wandering Tattler or the Surf-bird in the area; the associations are too violent, but we still yearn to record, in particular, the following: Golden Plover, Black Rail, Yellow Rail, Knot, Pectoral Sandpiper, Red Phalarope, Black-necked Stilt, and Black Tern. Club members have a plan to reopen an old artesian well and to equip it with a windmill and thus flood part of a small meadow to the south of the west pool; without doubt this would help solve some of the desiderata, and others as well, for later records. The larger practical program of mosquito control may, however, nullify the plan. —E. W. MARTIN, *Palo Alto, California, February 23, 1939.*

Nesting Records of the Red-shafted Flicker from Charleston Mountain, Nevada.—In his "Birds of the Charleston Mountains, Nevada" (Pac. Coast Avif. No. 24, 1936, p. 27), van Rossem makes the observation that the Red-shafted Flicker was not found nesting in the area and that "no nest holes were found, nor was a single flicker seen in July and August, 1932. ... I have no explanation to offer as to why flickers apparently avoid the mountains of southern Nevada during the breeding season."

During July, 1938, I discovered two nests of this flicker in the aspen grove at the Kyle Canyon Campground at Charleston Mountain. Both homes were still occupied when I revisited the area in August, but apparently the young were gone at that time. Both pairs of flickers appeared to be *Colaptes cafer collaris*.—RUSSELL K. GRATER, *Boulder City, Nevada, February 3, 1939.*

Butcher-bird Butchers Toad.—While making bird observations at Benicia, California, on March 1, 1939, I noted a California Shrike (*Lanius ludovicianus gambeli*) fly into a roadside group of weeds, mostly dry anise stalks, with something in its bill. I trained my field glasses on it and found it vigorously impaling a victim on the dry stub of one of the anise stalks, pulling it down with considerable effort in order to make the blunt end of the dry weed pierce the skin of the victim. Upon approaching the spot I found the prey of this bird to be an adult Pacific tree-toad (*Hyla regilla*).

Mr. J. D. Graham, of Benicia, this week saw a shrike carrying a fence lizard which he said looked large for the comparatively small captor to handle.—EMERSON A. STONER, *Benicia, California, March 17, 1939.*

Fossil Fringillids from Rancho La Brea.—The scarcity of passerines in lists of fossil birds is the result of several factors. Most passerines are small and the consequent fragility of their bones makes preservation unlikely. Small bones are often overlooked or neglected by collectors; and even when available, the uniformity in size and configuration in many groups makes identification difficult.

The fringillids, especially, present a problem in separating species on the basis of skeletal elements. Not only is there a large number of species in the family, but osteologically they are remarkably uniform. Such elements as tarsometatarsi and humeri, that in other groups show excellent characters, yield meager clues to the identity of most fringillid species.

There have been no previous records of specifically identified fringillid remains in the Pleistocene of Rancho La Brea. However, A. H. Miller (Univ. Calif. Publ. Bull. Dept. Geol. Sci., vol. 21, 1932, pp. 169-194, pls. 12-14) found remains of Pine Siskin, Red Crossbill, Spotted and Brown towhees, and Fox Sparrow in the Carpinteria Pleistocene.

The part of a fringillid that is always thought of as most characteristic is the heavy, conical bill. Within the family the bill has undergone great modification, even when other elements have remained relatively unchanged. The range of variation in fringillid bills, with such extremes as those of Evening Grosbeak and Brewer Sparrow, gives ample opportunity for differentiation. Thus it seems likely that the most accurate identifications can be made by careful study of this member. It is interesting to note that Miller (*loc. cit.*) identified the Pine Siskin, the Brown Towhee and the Fox Sparrow from bill parts.

In the collection from Rancho La Brea in the University of California Museum of Paleontology there are twelve maxillae which are referable to the family Fringillidae. These are from locality 2051 which is typically Pleistocene. All the fossil bills were broken from the skull in the nasofrontal area, but they are relatively well preserved.

Three were recognizable as members of the genus *Spinus* and another was referred to *Spizella*. The remaining eight could not so readily be separated on the basis of configuration. Most North American Recent species were eliminated on gross shape or size. Series of those which could not be thus eliminated were measured. The numbers of these available were as follows: *Pooecetes gramineus* 6, *Aimophila ruficeps* 6, *Amphispiza bilineata* 9, *Amphispiza belli* 13, *Junco oreganus* 11, *Melospiza melodia* 10, and *Melospiza lincolnii* 10.

The measurements taken were: Length of nostril; greatest distance transversely across nostril; anterior margin of nostril to tip; height of bill at front of nostrils; length from nasofrontal hinge to tip; greatest width across maxillaries; shortest distance from posterior margin of maxillopalatine to tip; and least width of nasal bridge of premaxillary.

With the aid of histograms prepared from the measurements, the fossils were compared with the known species. Those species that seemingly could not be distinguished when only differences in gross configuration were examined, showed easily recognizable differences in measurements. There is of course, much overlap, but fortunately each species can be separated from any one of the others on the basis of at least one measurement.

Seven of the fossils fell within the range of *Amphispiza belli* in every measurement, and none of these fell within the ranges of all the measurements of any other species. All characters of configuration also agree with *A. belli*.

The eighth bill is considerably smaller than the bills of *A. belli* and is easily separable from them. All its measurements fall within the ranges of the measurements of *Amphispiza bilineata* and all characters of configuration agree with that species. Again all other species are conclusively eliminated.

The three maxillae referable to *Spinus* are generically unmistakable, but closely allied species make specific identification more difficult. Miller (*loc. cit.*) describes *Spinus pinus* as being "distinctly larger and the culmen straighter than any of the North American goldfinches . . . in this genus." The straight profile of the culmen is consistent in a series of twelve bills of *S. pinus*, but the eight original measurements which I have employed show no salient differences in size between *pinus* and *tristis*. Both *lawrencei* and *psaltria* are much smaller than the fossils. An additional measurement,

namely, height of bill from the ventral surface of the maxillaries to the midpoint of the nasal bridge, solved the problem. In twelve bills *pinus* ranged from 2.5 to 2.9 mm. and *tristis* from 2.8 to 3.2 mm. One of the fossils with the straight culmen characteristic of *pinus* measures 2.5 mm. and one with the convex culmen of *tristis* measures 3.0 mm. The third has the convex profile of *tristis* but falls within the region of overlap, with a bill height of 2.8 mm.

The genus *Spizella* is also easily recognized, but again similarity of species in the group complicates the identification of the fossil. *Spizella arborea* is much larger than the fossil and *S. breweri* is smaller in all proportions. *S. pusilla, S. pallida* and *S. wortheni* are not considered because their ranges today are so far to the east. This eliminates all but *S. passerina,* with which the fossil agrees in all respects, and *S. atrogularis* of which there are no skeletons available. Comparison of skins reveals that *atrogularis* has a broader, stubbier bill than *passerina* which is relatively slender and acuminate. The tomial profile of *atrogularis* is straight, whereas *passerina* has slightly concave tomia. The fossil exhibits the characters of *passerina* and I refer it tentatively to that species but withhold final designation until skeletons of *atrogularis* are available.

Thus the following fringillids are presented as new to the Pleistocene avifauna of Rancho La Brea.

Subfamily Carduelinae	Subfamily Emberizinae
Spinus pinus	Amphispiza bilineata
Spinus tristis	Amphispiza belli
	Spizella cf. passerina

In reconstructing the climatic and biotic complexions of the past, it is the zonally and ecologically restricted plants and animals that furnish the best clues. If only the birds are used to interpret the ecology of Rancho La Brea in the Pleistocene, it is those species whose habitats are distinctly defined that yield the keys to the associations. The presence of Sage Sparrows and Desert Sparrows indicates a fairly arid climate. On the assumption that the habitat predilections of the Sage Sparrow have not changed, it is safe to suppose that chamise and artemisia grew near-by. The Desert Sparrow also fits well into the chamisal association. Even today it is occasionally found near the La Brea pits. Willett (Pac. Coast Avifauna No. 21, 1933, p. 172) gives the range of the species in southwestern California as, "... occasional on Pacific coast in fall, winter and spring, north and west to Los Angeles County." The nomadic goldfinches are poor zonal and ecologic indicators and either Chipping or Black-chinned sparrows would fit into the association.

The previous evidence relating to the ecology of Rancho La Brea in the Pleistocene, as interpreted from the birds, has been well discussed by A. H. Miller (Condor, vol. 39, 1937, pp. 248–252) who concluded that the general aspect was more arid in the Pleistocene than today. Some of the plants and animals were desert inhabitants. The additional species reported here corroborate this conclusion and lend more detail to the already well defined picture of the La Brea Pleistocene.

I gratefully acknowledge the counsel of Dr. Alden H. Miller throughout the preparation of this paper.—CHARLES SIBLEY, *Museum of Vertebrate Zoology, University of California, Berkeley, April 22, 1939.*

Snowy Plover from Colorado.—We wish to record a specimen of the Western Snowy Plover (*Charadrius nivosus nivosus*) which we collected at Barr, Adams County, Colorado, on April 26, 1939 (no. 20014, Colo. Mus. Nat. Hist.). The plover, a female, was the only shore bird on the extensive bar of Clarkson Lake at the Mile High Duck Club. Its dorsal coloration is similar to specimens from Oregon and California; the bird is rather large, with a wing measurement of 106 mm., so although we rather expected it to be *tenuirostris,* we have concluded that it belongs to the western race. The taking of this specimen adds another species to the list of Colorado birds.—ALFRED M. BAILEY and ROBERT J. NIEDRACH, *The Colorado Museum of Natural History, Denver, Colorado, April 28, 1939.*

NOTES AND NEWS

Plans are nearing completion for the Fifty-seventh Stated Meeting of the American Ornithologists' Union to be held in the San Francisco Bay region in June of this year. On Monday, June 19, business meetings will be held at the Durant Hotel in Berkeley. The regular sessions open on Tuesday morning, June 20, with registration at 9:00 a.m., in Life Sciences Building, University of California campus. After two days of scientific program in Berkeley, the meetings will continue on Thursday, June 22, in San Francisco at the California Academy of Sciences. Field excursions are planned for both Friday and Saturday, June 23 and 24, including a trip to Marin County. Tuesday evening there will be open house at the Museum of Vertebrate Zool-

ogy, and the annual dinner is scheduled for Wednesday night. Persons planning to attend the meetings should write for reservations at once if they wish accommodations at the Durant Hotel. Members planning to contribute to the program should submit titles and abstracts of papers to the secretary of the Union, Dr. Lawrence E. Hicks, Ohio State University, Columbus, Ohio, well in advance of the meetings.—A.H.M.

A recent distinguished visitor to the Pacific coast was Mr. R. A. Falla, Director of the Canterbury Museum at Christchurch, New Zealand. Mr. Falla this year is visiting museums in the United States and Canada. Those Cooper Club members fortunate enough to have met with him greatly enjoyed his illuminating comments on North American avian migrants to New Zealand and came to appreciate his wide knowledge of birds of the Pacific basin.—A.H.M.

Dr. T. C. Stephens, Professor of Biology in Morningside College, Sioux City, Iowa, has served natural science in other ways beside teaching registered students. One of these has been in editing the *Wilson Bulletin*, journal of the Wilson Ornithological Club. Inasmuch as Dr. Stephens has just retired from this editorship after a period of fourteen years' continuous service (1925 to 1938, inclusive) it is fitting that we make record of the fact in the *Condor*, since the *Wilson Bulletin* has in considerable degree reflected ornithological accomplishment in the Far West as well as in the Mississippi Valley region, its special geographic sphere. Under Dr. Stephens' guidance, the size of the *Bulletin* increased about in the ratio of 2 to 3 in number of pages per annual volume. Its circulation expanded at about the ratio of 5 to 9. The quality of the articles tended upward through his attraction of contributions from the best minds and observers of the era, until now a late run of the *Bulletin* is essential to any student working with modern technique in bird-behavior and life-history. A noteworthy expansion has been in the department of "general notes," wherein much new even though scattering information has been recorded. The Editor's conscientious reviewing of current literature, soundly critical, has been a valued contribution to American ornithology; and his forthright comment on conservation matters, stating truths sometimes unpleasant to potent though minority groups, brought him and his journal the respect of all thinking naturalists. We cannot express ourselves better than by quoting from the latest issue of *The Nebraska Bird Review* (vol. 7, 1939, p. 24), wherein its Editor, Professor Myron H. Swenk, says: "Dr. Stephens made a remarkable success of the official organ of the Wilson Club.... These [14 volumes] will endure as a monument to his fine contribution in the bringing together and diffusing of scientifically sound information in the field of ornithology of the interior United States.... Dr. Josselyn Van Tyne, of the Museum of Zoology of the University of Michigan,

Fig. 30. Dr. T. C. Stephens, retiring Editor of the *Wilson Bulletin*.

is to be the new Editor of the Bulletin, beginning with the March, 1939, issue, and we can make no better wish for his success than that he may be able to maintain the high standards set by his predecessor; which, indeed, is our expectation." We add our own hearty wish to the same end. It is a pleasure to be privileged to reproduce a photograph of Dr. Stephens in connection with the present notice.—J. G.

The under-initialed has been working up a bibliography and synonymy (both scientific and vernacular) of Californian birds. In so doing, he has found certain errors in the printed literature so often as to justify special comment here, with the idea that future authors and editors who read this note will take pains to avoid them. Forster Tern again and again is written "Foster"; the

bird was named for Johann R. Forster of Germany, not "Doctor Foster" of Mother Goose! Vigors Wren is often written wrongly "Vigor's" Wren; this bird was named for the British ornithologist, Nicholas A. Vigors; if the possessive form be preferred, it should be spelled Vigors' or Vigors's. Samuels Song Sparrow was named for Emanuel Samuels of Boston, who in 1855 collected birds at Petaluma, California (see Palmer, Condor, vol. 30, 1928, p. 294); if the possessive form of his name be used, it should be written Samuels' or Samuels's, certainly not "Samuel's." Steller Jay is frequently written "Stellar" Jay; the species was named after Georg Wilhelm Steller, the first qualified naturalist to set foot on west-American ground; the word does not mean "pertaining to stars"! Savannah Sparrow is often rendered "Savanna" Sparrow; but it was given the name of the town, Savannah, Georgia, not that of a kind of grassland, the savanna; if a writer lower-case his vernacular names, he can only write, properly, Savannah sparrow. The Gambel (not "Gamble"!) White-crowned Sparrow was, of course, named after William Gambel of Philadelphia; so with Gambel Quail and some other vertebrates. The plural of titmouse is most correctly titmouses, not "titmice."—J.G.

Students looking into the history of western ornithology will find decided interest in reading the "Autobiography | of | Isaac Jones Wistar | 1827–1905 | Half a Century in War and Peace" (Philadelphia, The Wistar Institute of Anatomy and Biology, 1937, pp. viii+528, 9 ills.). For example, herein one finds mention (pp. 42ff) of Gambel, for whom several of our Californian birds were named and who himself wrote the first good natural history accounts of some of our species. General Wistar says, quoting only here and there: "... In company with Dr. William Gambel, assistant curator of the Philadelphia Academy of Natural Sciences, a young naturalist and author already of some distinction, I started [from Philadelphia] at 11 P.M., April 5, 1849, on an expedition which led me during many years through much wild and precarious adventure, and directly or indirectly shaped all my future life and career." At Independence, Missouri, where westward expeditions outfitted, "Dr. Gambel had joined himself to five Virginians who with their one wagon and eight mules traveled with us." "June 2nd. [on the Platte River]. Made another march of twenty miles. Gambel being desirous of traveling more leisurely and comfortably, left us today and joined the large ox train led by Captain Boone of Kentucky, who is anxious to have him and will dispense with any aid from him in driving or working, in return for his medical services. We gave him a mule with his proportion of the tools and provisions. He is an amiable, excellent fellow and very pleasant in conversation.... But he is averse to camp duty and hard work, and fond of taking things easy, and there is no doubt that Boone's large train with plenty of men and animals, and leisurely rate of traveling, will suit him better than our headlong methods, especially as he has formed a warm friendship with Boone." General Wistar says further: "I never saw Gambel after that separation, and may as well state here what I did not learn till long afterward.... Boone's train after losing many teams and wagons in the Humboldt River desert, arrived late in the season at the Sierra, where they encountered more obstacles and losses, reaching California after the beginning of the rains. Gambel personally made his way as far as Rose's bar on Feather River, where he died almost immediately from typhoid fever resulting from the extreme privations suffered during the latter part of his journey. Either Boone himself or some of his party, among whom Gambel was a great favorite, were with him at the time of his death." Dr. T. S. Palmer (Condor, vol. 30, 1928, p. 278) states that Gambel died at the place above indicated, "December 13, 1849, while attempting to cross the Sierra in midwinter." The bird work for which we chiefly remember Gambel was done during his first stay in California, 1841 to about 1845.—J. G.

MINUTES OF COOPER CLUB MEETINGS

NORTHERN DIVISION

JANUARY.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, January 26, 1939, at 8:00 p.m., in Room 2503 Life Sciences Building, Berkeley, with President Emlen in the chair and 53 members and guests present. Minutes of the Northern Division for December were read and approved. Minutes of the Southern Division for November were read. Names proposed for membership were: Monroe D. Bryant, 1817 Oxford Street, Berkeley, by Frank Richardson, and Mrs. Georgia M. Miller, 655 Homer Avenue, Palo Alto, California, by Harry R. Painton.

The recording secretary reported that a letter had been sent to Mr. Fred Carlson, Fire Marshall of the city of Oakland, protesting the wholesale clearing of brush in lower Dimond Canyon, and that an answer had been received in the form of a telephone call from Mr. Carlson. He had explained that a portion of Dimond Canyon had been deeded over by the Bank of America to the city of Oakland for a park, and that clearing of brush was preparatory to planting of the area by the Park Department. Further plans of the Fire Prevention Bureau included the clearing of a fire trail, varying from 75 to 150 feet in width,

along the hills back of Oakland from the San Leandro line to the Berkeley line. After some discussion it was decided to defer any action by the Club until certain members had gathered definite information on the plans of the Park Department.

Mrs. Grinnell spoke of the great value of the Berkeley Aquatic Park for bird students, and recommended that members making observations there mail their lists to Mr. Charles W. Cresswell, City Hall, Berkeley, so that the real interest and appreciation of bird students might be made known to those responsible for the future development of the project. In this connection, Mrs. Grinnell reviewed W. L. McAtee's recent book, Wild Fowl Food Plants, which she had brought to Mr. Cresswell's attention.

Mrs. Grinnell also mentioned the addition of a large acreage of redwood forest, back of Mills College, to the Regional Parks, and suggested that the Cooper Club might add its influence in emphasizing the desirability of keeping the area in its natural condition. She moved that the incoming president appoint a committee of three members for one year, to handle all conservation matters which might come before the Club. (The motion was temporarily withdrawn, to permit the passage of a technical motion, relieving the old committee of its duties.) An amendment proposing to make the term of service of the committee concurrent with that of the president making the appointment was defeated, and the motion was carried in its original form.

As chairman of the nominating committee, Mr. Joseph Dixon took the chair and reported that the committee had decided to re-nominate the present officers to serve for another year. Election was held by show of hands and the report of the committee unanimously accepted. Upon resuming the chair, President Emlen expressed his appreciation at being able to serve the Club for another term. As conservation committee for the year, he appointed: Mr. Brighton C. Cain, Chairman; Mrs. G. Earle Kelly; and Mr. Elmer Aldrich.

The evening's program was devoted to winter field notes reported by members, and the number contributing was highly gratifying. Mr. McClintock opened with winter observations of several years ago, at Manzanillo on the west coast of Mexico. Certain general impressions remained as clear pictures which he set forth: The great numbers of sea birds in the harbor of Manzanillo, both on the water and soaring high above; exact details of the Brown Booby's method of fishing; an upstream wading trip where, amid the exotic jungle setting, with colored tropical birds, a Spotted Sandpiper suddenly appeared. Mr. Aldrich spoke briefly, also of Mexican experiences, mentioning especially the amazing tameness of raptorial birds, a condition which he attributed to the high cost of ammunition. Mr. Sibley reported the birding still good on Sears Point Road, in spite of the increased traffic due to removal of toll. His list included 3 Snowy Egrets, 8 White-fronted Geese, and a White-tailed Kite. His record of a male Barrow Golden-eye at the Berkeley Aquatic Park, January 22, gave further evidence of the park's value, and he urged that more attention be given it by observers.

Miss Rinehart reported the observing of an American Egret at Lake Merritt, January 16, and Mr. Covel finished the report with the assurance that the egret had finally found its way from the museum roof to a proper location within the sanctuary. Mr. Laidlaw Williams asked whether any of the color-banded gulls had been sighted in this region, giving some of his own records and urging alertness of all observers. His comprehensive observations on the Monterey peninsula included report of two species new to his lists for the region, an American Bittern November 17, and a California Clapper Rail at "El Estero" December 27 and January 9. Mrs. Kelly had seen a Bush-tit's nest at Alameda, already lined on January 12.

Mr. Alden H. Miller reported a species for which there are few records in Berkeley. Crossbills were seen in Strawberry Canyon December 27, and near Arlington Avenue January 22. Mr. Emlen noted the increase over last year of many common winter visitants to the Sacramento Valley, especially juncos and Lincoln Sparrows. At a point near Butte City where 240 Wood Ducks had been seen last year, they numbered around 200 again this year.

The club was privileged to hear an informal report of many of his latest observations by Mr. Ernest I. Dyer. Outstanding was his description of a blue color taken on by the crown and throat of the Anna Hummingbird after bathing. Through a thick film of water the feathers appeared normally red, when the film was first wiped off the effect was black, at a critical moment in drying the blue color was striking, and then the usual red returned. Experiments with a preserved hummingbird skin confirmed these details. Mr. Dyer suggested that since the color in the hummingbird's feathers is structural, resulting from diffraction effects, here would be a problem for some student interested in physics to undertake with the use of wet diffraction gratings.

Adjourned.—FRANCES CARTER, *Recording Secretary.*

FEBRUARY.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, February 23, 1939, at 8:00 p.m., in Room 2503 Life Sciences

Building, Berkeley, with President Emlen presiding and 48 members and guests present. Minutes of the Northern Division for January were read, corrected and approved. Minutes of the Southern Division were read by title only. Names proposed for membership were: Edwin Vance Miller, Museum of Vertebrate Zoology, Berkeley, by Alden H. Miller, and Robert R. Talmadge, 505 N Street, Eureka, California, by Robert T. Orr. Mr. Emlen announced that due to the University's Charter Day on March 23, the next meeting of the club would be held on March 16.

Dr. R. A. Falla of the Canterbury Museum of New Zealand was present, and President Emlen extended to him the welcome of the Club. Mr. Falla was making his first visit to the United States. He called attention to the remoteness of New Zealand from the scientific centers of North America and Europe and pointed out that practically our only ornithological contact is through the birds themselves, represented by such migrant species as Sooty Shearwaters, which visit us as well as the people "down under."

Mr. Alden H. Miller read a resolution expressing the deep sorrow of the Club at the loss of a most valued member, in the death of Ernest I. Dyer on February 4, 1939. (A copy of the resolution is filed with the minutes of this meeting.)

Mr. Cain reported that the conservation committee had interviewed Mr. Hyde, landscape architect of the Regional Parks, urging that native plants be left, in order to preserve the natural habitats of native birds. Mr. Hyde told the representatives that it was hoped that some of the park area would be left in a primitive condition. Mr. Aldrich will keep in touch with the Berkeley Aquatic Park officials and an attempt will be made to keep the park attractive to birds. Mr. Alden Miller reported on recent literature by calling attention to Charles Hellmayr's latest volume of the "Catalogue of Birds of the Americas." This volume deals mainly with the large family of fringillids.

Field notes were opened by Mr. Dexter, who reported a large number of Mountain Bluebirds in the Livermore Valley. Mr. Moffitt reported that Major Allan Brooks had collected two Knots at Morro Bay, January 15. When Mr. Moffitt visited Major Brooks there on January 27, Long-billed Curlew and Royal Terns were present in good numbers. Mr. Harry R. Painton described the coloring and behavior of an albino Robin which had been present on the Stanford campus for several days. Mr. Emlen reported a great influx of Robins at Davis, and Mrs. Dexter added that at Portland, Oregon, on February 8, she had seen large numbers of Robins feeding on red berries. Mr. Cain reported Rufous-crowned Sparrows on February 4 at Lake Temescal, an albino Spotted Towhee near Palo Alto February 5, and on February 19 noted two Red-winged Blackbirds in the cattails at the small pool at the south end of the Berkeley Aquatic Park. On February 22 he observed 68 American Mergansers on San Leandro reservoir, all but four of them males. Mrs. Allen told of seeing 50 Green-winged Teal near Alvarado February 27. Miss Stedman reported Mockingbirds near her residence in Oakland, and Mr. Benson added that he often noted a mocker near Scenic Avenue and Rose Street in Berkeley. Mr. Sibley reported 73 Whistling Swans and about 5000 White-fronted Geese on Victoria Island, February 12. At Los Baños, February 13, notable records were of a Snowy Egret, 8 Gadwall, a flock of more than 40 White-faced Glossy Ibis and over 100 cranes. The interesting mating antics of the cranes were observed at close range. The ratio of subspecies was 4 Sandhill Cranes to one Little Brown Crane.

The speaker of the evening was Mr. James Moffitt, who presented, under the title of "Winter Birding in New England," an interesting comparison of two localities in the vicinity of Boston. Mr. Moffitt, in company with several well-known "bird-watchers," including Ludlow Griscom, visited on January 8, 1938, parts of Essex County to the north of Boston and, on January 9, Barnstable County, in southeastern Massachusetts, which contains the whole of Cape Cod. The biotic complexions of the two regions are quite different. The cold Labrador Current exerts its influence south to Cape Ann in Essex County, while the warm Gulf Stream is felt north to Cape Cod. The effects are reflected in the bird populations. At Cape Ann, boreal species find their southern limits, and at Cape Cod, many austral species reach their northern boundary. A comparison with California was made, not only of bird species, but of bird observers as well. Fewer birds winter in New England than in California, but amateur ornithologists there are much more numerous and, in Mr. Moffitt's opinion, more enthusiastic. As evidence, the Christmas census listers for the San Francisco Bay region and for Cape Cod were cited. The comparison was definitely in favor of the east.

Adjourned.—CHARLES SIBLEY, *Acting Secretary.*

SOUTHERN DIVISION

DECEMBER.—Due to the Christmas holidays, the regular December meeting of the Southern Division of the Cooper Ornithological Club was postponed one week, being held at the Los Angeles Museum on Tuesday, January 3, 1939, at 8 p.m. President McCoy was in the chair, and about fifty members and guests were present.

The minutes of the Southern Division for November were read and approved. Five applica-

tions for membership were read, as follows: Julius H. Comby, 256 N. Walnut St., Pico, Calif., by Blanche Vignos; Keith L. Smart, Box 206, Indio, Calif., by Sherwin F. Wood; Perley C. Chadwick, 426 W. Olive Ave., Redlands, Calif., by Dr. Charles A. Warmer; and Donald Child Alexander, 18 Hurd St., Lowell, Mass., and J. M. Winran, Caulfield P.O., West Vancouver, B.C., Canada, both by W. Lee Chambers.

The Secretary reported the receipt of a letter from the Pacific Division of the American Association for the Advancement of Science announcing the next meeting at Stanford University, June 26 to July 1, 1939, and asking that if the Club as an affiliated society wishes to participate in the program it so notify the association before February 10. Mr. McCoy asked for comment and in the absence of such, suggested the matter be dropped.

Mr. Clinton G. Abbott reported that the San Diego Society of Natural History is starting a movement to make of the Buena Vista Lagune a bird sanctuary and is seeking support from other interested societies in the form of resolutions favoring the move. Mr. Howard Robertson moved that the Southern Division of the Cooper Ornithological Club pass a resolution favoring the use of Buena Vista Lagune as a bird sanctuary and recommending the adoption of such ordinances by the county of San Diego as may be necessary to bring this about. The motion was passed with one dissenting vote, from Dr. Bishop.

Mr. Abbott was the speaker of the evening and talked on "Sixteen Years Experience with the Christmas Bird Census." His talk presented an interesting survey and history of the taking of this census, and some results derived from it, the most important of which being the information obtained on the matter of increase and decrease of species, following changes in certain areas and closed seasons on certain birds. Questions and discussion followed Mr. Abbott's talk.

Dr. Miller then brought up a matter of business concerning the meeting of the A.O.U. in Berkeley in June, 1939, and the possibility of dispensing with the regular annual meeting of the Cooper Club in order to devote the Club's energies to making the A.O.U. meeting a success. Dr. Miller moved that members of the Southern Division of the Club go on record as favoring vacating an annual meeting this year in favor of the A.O.U. Robert T. Moore seconded the motion. After some discussion the motion was unanimously carried. Mr. McCoy appointed the following members as a committee on nominations for the officers of the Southern Division for 1939: Mr. Howard Robertson, Mr. J. R. Pemberton, Mr. I. D. Nokes.

Adjourned.—HILDEGARDE HOWARD, *Secretary.*

JANUARY.—The regular meeting of the Southern Division of the Cooper Ornithological Club was held at the Los Angeles Museum, Exposition Park, on Tuesday, January 31, 1939, at 8 p.m., with Mr. McCoy presiding and about 75 members and guests attending. The minutes of the last meeting of the Southern Division were read and approved. Two applications for membership were read: R. L. Rudd, 404 N. Main St., Salinas, Calif., proposed by O. P. Silliman; Gilbert G. Benjamin, Jr., 2297 West 23rd St., Los Angeles, by Mrs. N. Edward Ayer.

The Secretary read a communication from Mr. Laidlaw Williams asking the coöperation of Cooper Club members in the matter of obtaining all the information possible concerning the White-tailed Kite. Mr. Williams is chairman of a committee which will undertake the organization of a plan for the conservation of these birds, the plan to be based upon as much knowledge as can be obtained regarding their habits, distribution, nesting localities, nesting dates, etc.—all information to be kept in strict confidence.

Other communications reported upon by the Secretary were: A letter from the Los Angeles Chamber of Commerce, indicating a desire to have the members of the A.O.U. visit Los Angeles while in California; a letter from the Golden Gate Exposition inviting the Cooper Club to meet at Pacific House on the fair grounds; and an invitation to Cooper Club members from the American Wildlife Institute to attend their Fourth Annual Wildlife Conference in Detroit in February.

Mr. Howard Robertson reported upon the recommendations of the nominating committee for officers of the Southern Division for the ensuing year. The nominees were Sidney Peyton for President, Robert T. Moore for Vice-President, and Hildegarde Howard for Secretary. No further nominations were forthcoming and the persons named were unanimously elected. Mr. McCoy then turned the meeting over to Mr. Peyton. Mr. Willett moved that a vote of appreciation be given the retiring officers. The motion was duly seconded and carried. Mr. Howard Robertson announced that at a meeting of the Board of Directors of the Cooper Club it was decided that no annual meeting of the Club will be held this spring. It will possibly be held in the fall, or will be held over until 1940.

The business of the evening being completed, Mr. Peyton introduced Mr. Ed N. Harrison, who presented four reels of moving pictures of bird life: Birds of the Sierras; Life History of the Barn Owl; Life History of the Least Tern (2 reels).

Adjourned.—HILDEGARDE HOWARD, *Secretary.*

For Sale, Exchange and Want Column.—Each Cooper Club member is entitled to one advertising notice in any issue of The Condor free. Notices of over ten lines will be charged for at the rate of 15 cents per line. For this department, address JOHN McB. ROBERTSON, Buena Park, California.

FOR SALE—The Auk, vols. 1 to 54, complete in parts as issued, all good copies, $160.00; also another run; vols. 4 to 54, only one number missing (vol. 6, no. 1), fifty volumes, all good copies, $120.00; another short run, vols. 15 to 22, seven volumes, mostly as new, $14.00. Also some odd volumes and odd numbers.—W. LEE CHAMBERS, *2068 Escarpa Drive, Eagle Rock, California.*

BIRD REFERENCE work of any kind done at the U. S. National Museum for distant ornithologists. I have full access to the collections and library. Terms: 50 cents per hour. Address: DR. E. M. HASBROUCK, *U. S. National Museum, Washington, D. C.*

WANTED—Birds of Iowa, by Anderson; Birds of Ohio, by Dawson; Birds of Oklahoma, by Nice; California Mammals, by Stephens; Distributional List of Freshwater Fishes Known to Occur in California, by Evermann and Clark.—E. WHITNEY MARTIN, *525 Lincoln Avenue, Palo Alto, California.*

WANTED—Oceanic Birds of South America, two volumes, by Murphy. I still have about 300 bird skins which I will sell for one-half my original prices. If interested send for a list.—J. F. FRAZIER, *724 Proctor Place, Independence, Missouri.*

WANTED—We need The Auk, vol. 28, no. 3, July, 1911.—F. KERMODE, *Provincial Museum, Victoria, British Columbia, Canada.*

FOR SALE—Only four sets of Zoe left. Five dollars a set.—W. LEE CHAMBERS, *2068 Escarpa Drive, Eagle Rock, California.*

NORTH AMERICAN FAUNAS FOR SALE—The lot, $15.00. Or will exchange for a copy of Roberts' Birds of Minnesota. Faunas nos. 1, 2, 4, 8, 12, 15, 18, 24, 30, 31, 32, 34, 35, 36, 37, 38, 41, 43, 45, 48, 51, 54, 55.—GEO. G. CANTWELL, *3602 Keystone Avenue, Palms, California.*

WESTERN BIRD-BANDING ASSOCIATION

Modesto Funnel Trap, 24″ x 24″ x 8½″; in the United States, west of Mississippi River..... $4.50 postpaid

East of the River, and in Canada..... $5.00 postpaid

W. B. B. A. Government Sparrow Trap, 14″ x 28″ x 10″; in the United States, west of Mississippi River..... $4.50 postpaid

East of the River, and in Canada..... $5.00 postpaid

W. B. B. A. One-cell Trap, 7″ x 11½″ x 8″; in the United States, west of Mississippi River..... $1.25 postpaid

East of the River, and in Canada..... $1.40 postpaid

W. B. B. A. One-cell Trap, 5″ x 7½″ x 8″; in the United States, west of Mississippi River..... $1.00 postpaid

East of the River, and in Canada..... $1.15 postpaid

W. B. B. A. Warbler Trap, 8½″ x 15½″ x 9½″; in the United States, west of Mississippi River..... $3.00 postpaid

East of the River, and in Canada..... $3.25 postpaid

Rogers Two-V-cell Trap, 8″ x 8″ x 8″; in the United States, West of Mississippi River..... $1.50 postpaid

East of the River, and in Canada..... $1.75 postpaid

Address: MR. WALTER I. ALLEN, 2057 Pepper Drive, Altadena, California.